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IN MEMORIAM

GEORGE GELLHORN
1870—1936

GEORGE GELLHORN, a member of the Advisory Editorial Board of the JOURNAL, died January 25, 1936, at St. Louis. He was born in Breslau, Germany, November 7, 1870, the son of Adolph Gellhorn, merchant, and Rosalie Pineus. He attended the Gymnasium at Ohlau near Breslau, 1876 to 1890 and had his medical degree in 1894 from the University of Würzburg. In 1903 he married Edna Fischel of St. Louis; his children are George, in business; Walter, assistant professor of administrative law at Columbia; Martha, writer; and Alfred, student of medicine. He served as assistant in clinics at the Universities of Berlin, Jena and Vienna from 1895 to 1899; practiced in St. Louis, Mo., since 1900; was instructor and lecturer in gynecology, Washington University School of Medicine, from 1904 to 1922; Professor of Gynecology and Obstetrics and Director of Department, St. Louis University School of Medicine, 1922 to 1932, and Professor of Clinical Obstetrics and Gynecology at Washington University School of Medicine since 1932. He served as Gynecologist at the Barnard Free Skin and Cancer Hospital, Gynecologist and Obstetrician at St. Luke's and Jewish Hospitals, Associate Gynecologist and Obstetrician at Barnes and St. Louis Maternity Hospitals; Consultant Gynecologist of the Missouri Pacific and St. Louis County Hospitals, and was a member of the American Gynecological Society (President 1931), American Gynecological Club (President 1915), Deutsche Gesellschaft für Gynaekologie until 1934; the American Medical Association, St. Louis Medical Society; Founder and Member of Board of Governors of the American College of Surgeons; Bacon lecturer 1931; Gilliam lecturer 1932.

If one gauge of acclaim is the span of a man—his fullness of life and his versatility of interest—then indeed we hold George Gellhorn high.

If one measure of satisfaction is depth of feeling—then greater love had few men, greater good will gave no man. If remembrance of a worker is metered by all-round service in his chosen field—then here is one who can go and never be gone. His contributions endure through the printed word; it is his character that escapes characterization. The deep tones of the organ could match his crescendo laugh, but not its contagion; only his friends can express his talent for friendship; his patients, for comprehension; his students, for inspiration; his worthy mate, his worthiness.

The Gellhorn we knew might be portrayed in the terms of certain travellers to clinics and operating rooms and laboratories, the highly selected and intimate group of fellow specialists, the Gynecological Travel Club, of which he was president in 1915. They had a way of speaking of a man as being as learned and thorough as a German, as cautious and sane as a Briton, as lucid as a Frenchman, as inventive and skillful and considerate of the patient as an American, as much of a cross among all of these as a Scandinavian; with some such combination of qualities the genial man from St. Louis could be defined. No trip of the Club ever ran on ball bearings such as the epochal tour he engineered.

Dr. Gellhorn's wide culture, his familiarity with literature, singing and pictorial art, and his incessant study, may have derived from foreign training, and his keenness for travel from an early steamship service to the Far East, but the spread and the scope of the inquiries in his special fields and the breadth and the balance of judgment were surely matters of self-growth. Here was a surgeon drilled in Germany and later active in or, as head of several hospital services and keen on visiting other operators at work, yet in no wise to be diverted from the patient as a person and from medical considerations, and producing the best of the treatises on *Non-Operative Gynecology*. (It was issued in 1923 and 1931, handicapped by being one of a series not released singly.) The presidential address before the American Gynecological Society was a masterly summary of the subject of constitution, the body as a whole and the nervous system, in their bearing on disorders of women. The papers on techniques of diagnosis and treatment and operation, including cystoscopy and vaginal disturbances, run to some forty titles. There are several mechanical perfectings such as the powder blower, the pessary for prolapse, and the colposcope simplified to be worn like auto goggles. The protein therapy for pelvic exudates which he helped develop (his milk injections) has saved many from colpotomy, and the heat treatment he urged, many from salpingectomy. His notable teaching ability is nowhere better shown than in the *Gynecology for Nurses*.

In the combined activities of obstetrician and gynecologist, Gellhorn did his full share in promoting expertness among the former in order to save women from need of expertness among the latter; of his twenty obstetric papers several relate to the puerperium. One of his devices is a delivery table. His alertness during forty years accelerating the steps of progress in the care of cancer may be gauged by the thirty-four articles among one hundred and thirty titles opposite his name. With Mackenrodt he learned the attack by the heated knife; his experience enabled him to compare, as few here can, the indications for removal by the vagina as against those of the approach through the abdomen; he studied the results from operation versus irradiation, and the combination of the two, and concerning treatment of the parametrium. For the inoperable cervical growth he originated the minimizing of unpleasantness through hardening with acetone.

Gellhorn has been our authority on syphilis among women and his monograph is a classic. In hysterectomy he held that use of the lower route in suitable cases was a subject too little considered in the United States. His is the simplest peritoneal cover for the cervical stump. In anesthesia he made special studies, working at techniques and indications for spinal and local application.

At story telling this comrade had few equals, and competitive good talk he trained at the home table. He was a purist in English, in French, in Latin; a lover of clarity. Learned and modest and many-sided, George Gellhorn has performed a memorable part in setting forward our standards, professional, human and humane.

Robert L. Dickinson.

The Editors of the JOURNAL desire to add their tribute to the foregoing obituary, in which are expressed so well the outstanding attainments and qualities of George Gellhorn by a close friend and associate of many years' standing. Dr. Gellhorn took an active and intimate part in the founding and organization of the JOURNAL; he was a member of the Advisory Editorial Board from its establishment, ever solicitous of its welfare, a frequent contributor to its pages, and a highly valued associate. We rejoice in his having been with us—we regret, as do a host of friends and colleagues, his untimely death.

George W. Kosmak.
Hugo Ehrenfest.

Original Communications

PRIMARY SQUAMOUS CELL CARCINOMA IN THE BODY OF THE UTERUS

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IT IS one of the basic characteristics of cancer that it reproduces, in a disorderly fashion, the mother tissue from which it originates. Applied to the uterus, this means that cancer upon the cervix is invariably of the squamous cell variety. By the same token, cancer starting in the uterine cavity reflects the cylindrical epithelium and the glandular structure of the endometrium. Curiously enough, cases have been observed where a *primary* carcinoma of the uterine body was of the squamous cell type. Such instances are rare. In 1928, Lahm[1] could collect only about 20 authenticated cases from the German literature. In the United States, Cullen[2] and Norris[3] each reported one case;* and the latter author quoted two pertinent observations from England.[4, 5] More recently the French[6] and Italian[7] literature contributed one report each, a total of about 25 cases though some may have escaped my search, and some may never have found their way into print. At any rate the condition is sufficiently extraordinary and interesting histogenetically to justify the publication of every new case. Hence the following presentation of the two cases which I have seen personally. The first of these was published by me[8] almost forty years ago and is described again herewith; the second came under my observation only within the last few weeks.

CASE 1.—Woman of fifty-eight years, mother of five children. Menopause eight years previously. Fairly free bleeding on three occasions, in July and August, 1895. No other signs or symptoms. Uterus almost the size of a fist, forward, freely movable. Cervix and external os perfectly normal on sight and touch. After sufficient dilatation the finger encountered, about one-half inch above the external os, a fairly hard and irregularly warty mass which occupied, in an annular fashion, the upper part of the cervical canal and the lower segment of the uterine cavity. Large pieces removed with the curette appeared macroscopically covered with a thick, bluish gray skin and, on microscopic examination, plainly showed the picture of squamous cell carcinoma. A vaginal hysterectomy with the thermocautery was performed by my chief, Prof. Mackenrodt of Berlin, on Aug. 28, 1895; and one year later, when I reported the case, the patient was still free from recurrence.

The uterus (Fig. 1) was 11.5 cm. in length; its walls were thick and contained a small intramural fibroid in the fundus. The location of the tumor, as shown in

*Smith and Grinnell (Am. J. Obst. & Gynec. 15: 834, 1928) merely mention in a brief sentence that among their series of corpus cancers, there were two squamous cell carcinomas.

the illustration, corresponded closely to the preoperative findings. The lower half of the cervical canal and the surface of the vaginal portion were quite normal. The newgrowth was essentially superficial, but even with the naked eye the extension of the pathologic process into the underlying uterine wall could be seen plainly. Sections from the upper portion of the tumor (Fig. 2), that is, from the upper border in the uterine cavity (*b*) to the internal os (*a*) showed papillary excrescences in which slender connective tissue stems carrying blood vessels, were covered with many layers of squamous cells. Most of these were hornified, and in many places typical horn pearls were present. Nowhere was there a trace of the original cubico-cylindrical epithelium and the glands of the uterine mucosa. Where the growth had invaded the musculature, a few muscle fibers (*m*) were discernible. Even in this

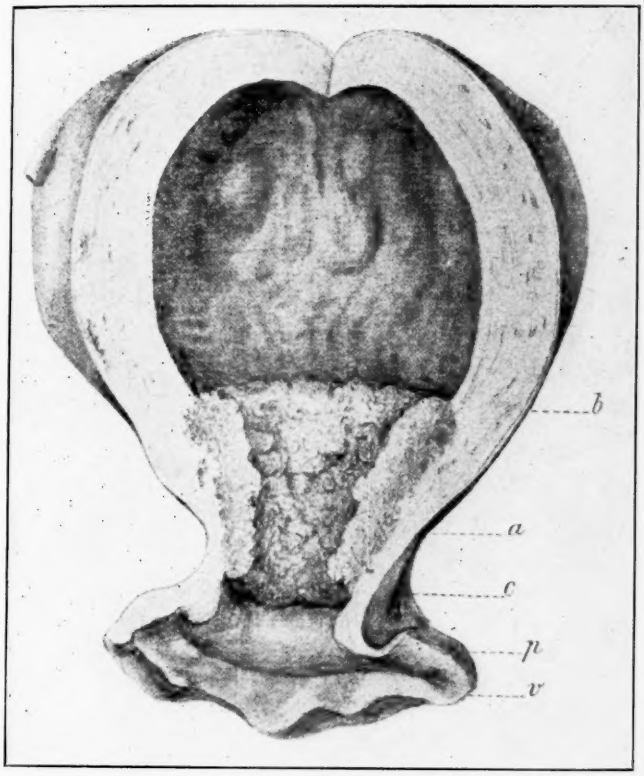

Fig. 1.

deepest layer epithelial pearls were numerous. In contradistinction to these pictures, sections taken from the intracervical portion, that is from the internal os (*a*) to the lowermost border of the tumor (*c*) in the cervical canal, showed a greatly diminished activity of growth. Not only was the degree of hornification less but also here and there lumina of cervical glands could be seen. This indicated that the intrauterine part of the tumor was the older and, therefore, the primary seat of this unusual carcinoma which by continuity had extended to the cervical canal.

CASE 2.—Woman of fifty years, mother of two children, had noticed for the past five months a more or less constant bloody discharge. The uterus was about twice its normal size and of doughy consistency. In the speculum dark bloody discharge issued from the normal external os. The latter admitted the tip of the index finger, and the mucosa of the cervical canal was perfectly smooth on touch. The curette,

however, inserted to obtain material for biopsy, encountered an obstacle about one inch above the orifice and removed from this a rather large piece of tissue which, on microscopic examination, proved to be squamous carcinoma (Grade II). From these findings we deduced that we had to deal with a squamous cell cancer in the uterine cavity which with its lower pole protruded into the wide cervical canal. On June 29, 1935, the uterus was removed by vaginal hysterectomy from which the patient made a rapid and undisturbed recovery, and four weeks later a series of x-ray treatments was added.

Our preoperative diagnosis was fully confirmed on opening the uterus (Fig. 3). Almost the entire anterior wall was covered by a neoplasm which filled and distended the uterine cavity. The surface of the growth was quite uneven due to

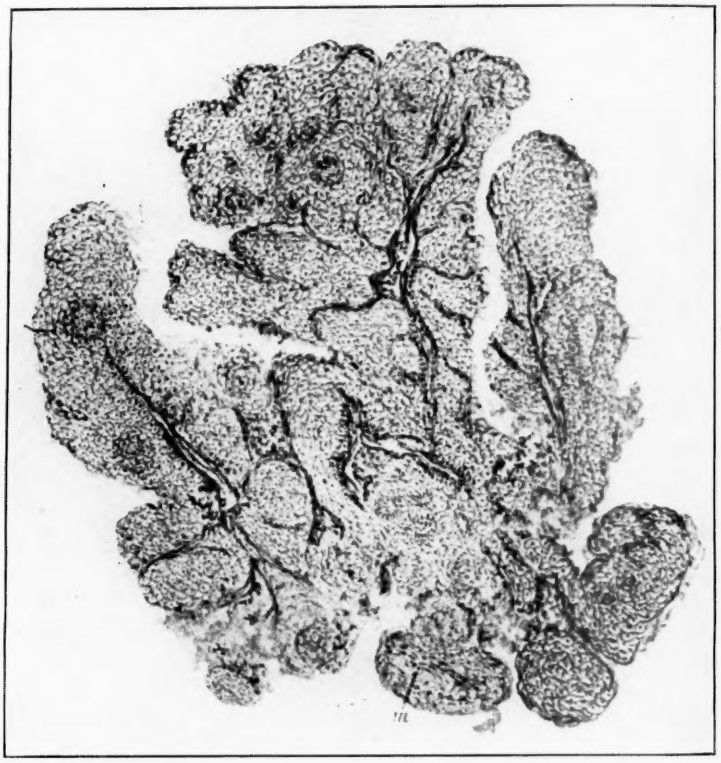

Fig. 2.

numerous crevices; here and there finger-like processes projected above the mass. The thickness of the latter ranged from 1 to 3 cm. In several places the involvement of the underlying musculature could be observed with the naked eye. On the whole, however, the development was superficial. The color of the surface was grayish white and distinctly different from the pinkish gray appearance of adenocarcinoma; just as the consistency was definitely harder than the mushy feel of the usual corpus cancer. The growth ended sharply at the internal os. The entire cervical canal was normal, and even after two months' hardening in formalin the arbor vitae is still plainly visible. The external os and the outer surface of the cervix were likewise perfectly normal.

Microscopically, the diagnosis is obvious (Fig. 4). The entire field is occupied by solid masses of cells divided by a ridge of connective tissue fibers. Nowhere is

there any trace of a glandular arrangement. The cells are for the most part fairly uniform in size, oblong, with well-stained nuclei and numerous mitoses. Here and there within this cell mass a few cells assume a larger size with a large cell body, and toward the left of the picture these fully matured cells present clearly the appearance of pavement epithelium.

Fig. 3.

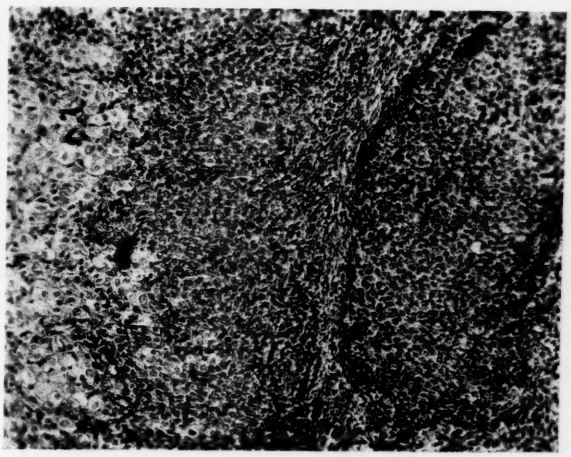

Fig. 4.

DISCUSSION

It is understood that the paper deals only with *primary* squamous cell cancer of the uterine body. This excludes at once those cases where the primary growth occupied the vaginal portion but extended, either by con-

tinuity or through the lymphatics, to the endometrium. Even where, as for instance in the two cases reported by Mickulicz-Radecki,[9] a direct connection between the homologous growths in cervix and corpus cannot be demonstrated grossly, serial section would reveal their interdependence.

Strictly speaking, squamous cell cancer arising in the upper part of the cervical canal and spreading into the uterine cavity, as in Cullen's[2] case, should likewise be excluded. But since they, too, spring from a surface normally covered with cylindrical epithelium, they may here be considered together with true primary squamous cell cancers in the corpus.

No squamous cell cancer can develop *directly* from cylindrical epithelium. The latter must needs first change into pavement epithelium. This change from one kind of epithelium into another is in itself not malignant, nor need it ever become so; it is only *potentially* a precancerous condition. Such a metaplasia has been explained in various ways.

1. In 1885, Zeller[10] reported 63 cases of chronic "endometritis" in which the single cylindrical epithelium of the uterine cavity had been replaced by multiple layers of pavement epithelium. This condition which was characterized by a distinct thickening of the affected area and a peculiarly whitish and glossy appearance, was termed by him *psoriasis uteri*. In most of these cases it was known that long-continued intrauterine applications of iodine, bichloride of mercury, or carbolic acid had been made. Since such chemical cauterizations in endometritis have become obsolete, this possible etiology of an epithelial metaplasia seems to have become extremely rare. No mention has been made in recent literature, and personally I have never seen a case of this kind.

2. In a pyometra of long standing the uterine cavity is frequently lined with a pyogenous membrane which, histologically, is composed of multiple squamous epithelium. From such a matrix cancer may occasionally develop, as it did, for example, in the cases reported by Gebhard[11] and Flaischlen.[12]

3. In the older literature chronic endometritis was repeatedly considered capable of producing metaplasia. Today we reserve the term endometritis only to the rather uncommon inflammatory processes which take place in the stroma. The surface epithelium is for the greater part cast off; of the remaining cells a certain number may through swelling and proliferation, *resemble*, but are never changed into, real squamous cells. This etiology, therefore, is no longer applied to metaplasia.

4. In 1896, Ries[13] described a case of chronic inversion of the uterus in which the mucosa was covered with squamous epithelium. This particular metaplasia which he called *ichthyosis uteri*, is readily explained by drying out and mechanical friction. It is, of course, as rare as the underlying condition itself.

5. Senile involution of the endometrium is possibly another etiologic factor in metaplasia and subsequent malignant degeneration, but the rarity of squamous carcinoma in the corpus renders this assumption rather problematical. In many hundreds of senile uteri I have found a *leucoplakia* only in one case. In this uterus removed from a woman of sixty-eight years, the leucoplakic area was, microscopically, benign; yet, we know that leucoplakias in any mucous membrane have a tendency toward malignant degeneration.

6. While all the metaplasias thus far mentioned, are of an *acquired* origin, the possibility of an *embryologic* etiology should not be overlooked. The muellerian ducts produce from one and the same kind of cells highly differentiated epithelial cells in the various parts of the genital tract. In the tubes the epithelium is high, cylindrical, ciliated; in the uterine cavity it is more cuboidal in shape and also

ciliated; in the cervical canal the cells are again high and produce mucus; and upon the vaginal portion and the vaginal walls the epithelium is of the multiple squamous variety. Occasionally this pavement epithelium extends a very short distance into the lowermost part of the cervical canal. It seems plausible that sometimes either "aberrant" squamous cells are left in the uterine mucosa or that among the uterine cylindrical cells some remain undifferentiated and later develop into squamous cells. All this, of course, is highly speculative. It is a fact, however, that squamous cells have been found in the uteri of newborn and infants up to two years of age (Natanson[14] a.o.). Although menstruation and pregnancy almost certainly do away with such embryonic remnants, this need not invariably be the case. This, at least, is my interpretation of the interesting observations made by Sitzenfrey,[15] Polano,[16] R. Meyer[17] and, more recently, Hintze.[18] These authors found squamous cell nodules in the hyperplastic endometrium and in true adenoma, and even in adenocarcinoma (Ewing[19]) of the uterus both in deeper layers and superficially. Though these accumulations of ectopic squamous cells not infrequently were hornified and even presented typical pearls, their benign nature could be established with certainty in every case. It is, however, entirely conceivable that such atypical formations may under the influence of an unknown stimulus undergo malignant degeneration and thus give rise to a squamous cell carcinoma in the uterine cavity.

In spite of the rarity of the condition the diagnosis presents no particular difficulties when the vaginal portion is found free and an exploratory curettage has yielded material which, on microscopic examination, reveals the picture of squamous cell carcinoma. Other diagnostic criteria, bleeding and, possibly, enlargement of the uterus, are probably identical with those of adenocarcinoma.

It was once believed that the prognosis was worse because squamous cell cancer in the uterine cavity possessed greater invasive tendencies than adenocarcinoma; but the available data are not conclusive.

Regarding treatment, hysterectomy, as in cancer of the body in general, is preferable to radiotherapy. This is nowadays fairly well established, and only recently Sampson[20] has stressed convincingly the limitations of intrauterine radium treatment. The latter should be reserved for truly inoperable cases or where the general condition of the patient renders any surgical intervention undesirable. Abdominal hysterectomy which, needless to say, should comprise the removal of the entire uterus and both adnexa, has the disadvantage that during the almost unavoidable kneading of the uterus carcinomatous particles may be dislodged into the vagina or the lymphatics, and thus jeopardize a permanent cure. Aside from utmost gentleness during the operation, the external os should at any rate be sewed up securely as a first step. On the whole, abdominal hysterectomy should, therefore, be employed principally where the uterus is greatly enlarged. In all other cases, vaginal hysterectomy is the method of choice. This is confirmed by statistics of imposing size. While the percentage of permanent cure from both the abdominal and the vaginal hysterectomy is about sixty, that of the vaginal operation alone is nearer eighty. If, in addition, the vaginal hysterectomy is carried out in local anesthesia, as advocated

by me[21] elsewhere, this operation loses to a great extent the character of a major and serious interference. It may seem superfluous to emphasize this point in connection with the present discussion, were it not for the fact that there are still medical schools in this country where vaginal hysterectomy is not taught at all, and hospitals where this operation is never performed.

SUMMARY

Two personal observations of primary squamous cell carcinoma in the body of the uterus are recorded and added to the very scanty international literature on the subject. Squamous cell cancer cannot develop directly from the cylindrical epithelium of the endometrium. There must first occur as a connecting link a change from the cylindrical into pavement epithelium. This metaplasia may be either the result of certain conditions acquired during the lifetime of the individual, or it may be the expression of a faulty embryonic development. Both these etiologic factors are discussed briefly. The treatment is by operation rather than by radiotherapy.

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METROPOLITAN BUILDING

Repetti, M.: Experimental Studies on the Immunizing Properties of Colostrum, Folia gynaec.-demograph. **31:** 505, 1934.

In studies on the defense giving power of colostrum against infections in general and *B. coli* in particular, in guinea pigs, the author found that colostrum does not play a great rôle in this respect and concludes that most likely immunity is passed on to the fetus through the placenta.

Considering the small relative amount of colostrum excreted by the human female as compared with cows, the writer comes to the conclusion that whatever protection is offered by the colostrum depends on the high protein and vitamin A content, as compared with milk.

MARIO A. CASTALLO.

PUERPERAL INFECTION DUE TO ANAEROBIC STREPTOCOCCI*

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ABOUT twelve years ago Dieckmann and one of us (O. H. S.) discussed the bacteriology of our cases of puerperal infection. Quite frequently in cases that were obviously infected, both uterine and blood cultures were negative. This experience caused us to focus our attention on the work Schottmüller reported in 1910, in which he called attention to the frequency of puerperal infection due to anaerobic streptococci. This work was never confirmed on a large scale outside of his own clinic. In 1921, Bingold, working in Schottmüller's clinic, reported further experiences with these infections.

On July 1, 1924, Dieckmann took charge of all cases of puerperal infection on our service, and blood and uterine cultures were grown both aerobically and anaerobically. In a little over a year, we were able to confirm all of Schottmüller's statements, and in this short period observed several fatal cases of infection due to anaerobic streptococci. The work was continued and subsequent reports show the high frequency of anaerobic streptococci in our cases.

Owing to the fact that anaerobic streptococci are found in the vaginas of 40 per cent of women at term, it is quite obvious that these organisms are not introduced, but give rise to endogenous infections. The circumstances under which these organisms take hold are in cases of prolonged labor where the tissues have been bruised to some extent, also in cases where the membranes have been ruptured for some time before labor, and in difficult operative deliveries. During the first two years of this work, it was clearly demonstrated, so far as our own cases which were uninfected before admission were concerned, that our problem was chiefly the keeping down of anaerobic infection, infections due to other pathogenic organisms being well controlled by proper obstetric technic.

From September, 1926, to January, 1930, we used instillations of mercurochrome, iodine and glycerin, routinely. This procedure was somewhat similar to that used by Bessesen. The morbidity due to puerperal infection was cut practically in half, the figure being fairly

*Read, by invitation, at a meeting of the New York Obstetrical Society, December 11, 1934.

low anyway. Since January, 1930, we have been using 1 per cent neutral acriflavine in glycerin, and the morbidity remained equally low (see Table II).

Up to the present time, that is, practically a period of eight years, the interesting fact has been that just one fatal case of thrombophlebitis has occurred and the incidence of this lesion has been materially reduced during this time. We believe these changes striking enough to indicate that considerable value is derived from the instillations. The technic of these instillations has been previously described by Brown.

The present report shows our experiences with puerperal infection over a ten-year period. Table I summarizes these experiences. By

TABLE I

NUMBER OF ADMISSIONS JULY 1, 1924, TO JULY 1, 1934 15,764	NUMBER OF DELIVERIES 13,237	NUMBER OF CASES OF PUERPERAL INFECTION 228				NUMBER OF DEATHS 31
TYPE OF INFECTION	NUMBER OF CASES	AEROBIC BACTERIA	ANAEROBIC BACTERIA	MIXED BACTERIA	NEGATIVE CULTURES	MORTALITY
Acute endometritis	216	35	128	52	1	0
Pelvic cellulitis	30	8	14	7	1	0
Peritonitis	23	5	8	10	0	16
Pelvic abscess	15	5	5	4	1	1
Pelvic thrombophlebitis	22	3	13	3	3	4
Septicemia	47	18	18	11	0	10
Cases of suspected endometritis	50	0	0	0	50	0
Anaerobic organisms present in 83.3 per cent of cases of endometritis.						

aerobic bacteria, we mean such organisms as hemolytic streptococci, staphylococci and *B. coli.* Anaerobic bacteria are in the main anaerobic streptococci. We have not been classifying the anaerobic streptococci into any certain groups, but have described their characteristics and these agree almost entirely in character with the organisms described recently by Colebrook and Hare.

Colebrook and Hare have offered a practical classification of the anaerobic streptococci found in cases of puerperal infection. The basis of differentiation is the variation in cultural characteristics.

Type A, most commonly found. Opaque colonies 1.5 to 2.5 mm. in diameter. No hemolysis. Cocci size of aerobic species. Long chains rarely seen. Very unpleasant fetid odor.

Type B, transparent colonies of smaller size than Type A. No hemolysis. Usually a "micro" type, only 0.3 to 0.4 microns in diameter. Difficult to keep alive. Usually do not produce gas.

Type C, slower growth. After a week, produce coal black colonies on blood agar. Extremely fetid odor.

Type D, very few strains which give hemolysis on the surface of blood agar. May be variants of Types A or B.

Colebrook and Hare were unable to state definitely how many of their strains belonged to Types A and B, respectively, partly because the differentiation has only gradually emerged during the progress of the work, many strains having been lost before they were recognized; partly also because the differentiation is not always sharp enough to identify strains definitely with one type or the other.

During our study of the anaerobic streptococci obtained from cases of puerperal infection, we have paid particular attention to the cultural characteristics of the organisms found in each case. The colonies have shown the characteristics as described by Colebrook and Hare and would fit into their method of classification very readily. The division into types has not been made, but will be from now on. The actions of the organisms upon meat media (Bell) are closely noted as to gas formation, odor, pigment formation and digestion. The latter observation is of the utmost importance in the consideration

TABLE II. MORBIDITY FROM PUERPERAL INFECTION

	ADMISSIONS	INFECTIONS	PERCENTAGE
July, 1924, to Sept., 1926	2,194	45	2.05
Sept., 1926, to Jan., 1930	5,385	68	1.26
Jan., 1930, to Jan., 1933	5,381	74	1.37
Jan. 1, 1933, to July 1, 1934	2,804	41	1.46

Of 74 cases of infection between Jan., 1930, and Jan., 1933, 43 were infected before admission.

Of 41 cases of infection between Jan. 1, 1933, and July 1, 1934, 32 were infected before admission.

TABLE III. MORTALITY FROM PUERPERAL INFECTION

	DELIVERIES	DEATHS	PERCENTAGE	SECTIONS
July, 1924, to Sept., 1926	1,913	6	0.313	2
Sept., 1926, to Jan., 1930	4,494	4	0.089	3
Jan., 1930, to Jan., 1931	1,587	1	0.063	1
Jan., 1931, to Jan., 1932	1,535	2	0.13	2
Jan., 1932, to Jan., 1933	1,350	0	0.0	0
Jan., 1933, to July 1, 1934	2,358	0	0.0	0
	13,237	13		8

TABLE IV. TYPES OF ORGANISMS IN TOTAL OF 31 FATAL CASES

Anaerobic streptococcus	15	(4)*
Hemolytic streptococcus	7	(2)*
Staphylococcus albus	7	(6)*
Streptococcus viridans	1	(0)*
Nonhemolytic streptococcus	1	(1)*
	31	(13)*

*Uninfected before admission.

TABLE V

PATIENT'S HISTORY NO.	DURATION OF PREGNANCY	INFECTED BEFORE ADMISSION	ABORTION		UTERINE CULTURE TYPES OF ORGANISMS	BLOOD CULTURE TYPES OF ORGANISMS	EXTENT OF PATHOLOGIC LESIONS AT DEATH	CHARACTER OF DELIVERY	AUTOPSY
			CRIMINAL	SPONTANEOUS					
B. H. 0-5832	20 wk.	No	–	–	None *Strep. putridus*	Hemolytic strep.	Endometritis septicemia	Ectopic unoperated	No. 2409 Coroner's case
0-6250	2 mo.	Yes	Yes		Anaerobic strep.	*Strep. putridus* An. strep.	Endometritis, infarct of lung, septicemia, pelvic thrombophlebitis		
0-6783	Term	No	–	–	Anaerobic strep.	Neg.	Endometritis, peritonitis, pneumonia	Cesarean section	No
1867	36 wk. Induced	No	–	–	Anaerobic strep.	Anaerobic strep.	Acute endometritis, pelvic thrombophlebitis, septicemia, embolic pneumonia	Twins, first spontaneous, second breech extraction. Macerated fetus	No
3706	Term	Yes	–	–	*Strep. hemolyticus*	*Strep. hemolyticus*	Septicemia, peritonitis, endometritis, pneumonia	Spontaneous	No. 2784
4003	Term	?	–	–	Anaerobic strep.	Anaerobic strep.	Peritonitis, general pelvic abscess, endometritis, septicemia	Cesarean section	No. 2817
4173	36 wk.	Yes	–	–	Anaerobic strep.	Neg.	Pelvic thrombophlebitis, pulmonary embolus (Ca. of uterus)	Cesarean section. Supravaginal hysterectomy	No

TABLE V—CONT'D

4668	Term	Yes	–	–	Anaerobic strep.	Neg.	Peritonitis, general	Cesarean section Supravaginal hysterectomy	No. 2828
4899	Term	Yes	–	–	Anaerobic strep.	*B. coli* Anaerobic strep.	Septicemia, endometritis, pelvic cellulitis	Instrumental, 11 days before admission	No
5510	Term	No	–	–	*Strep. putridus*	*Strep. putridus*	Endometritis, peritonitis local, pelvic thrombo., septicemia	Spont. mem. ruptured 51 hr.	No
6504	Term	No	–	–	*Staph. albus hemolyticus*	*Staph. albus hemolyticus*	Endometritis, infaret of lung, peritonitis	Induced	No
6702	2 wk.	Yes	Yes	–	None	*Strep. viridans*	Septicemia, infaret of kidney and spleen, thrombosis of cerebral artery	–	No. 2949
M. H. 22	32 wk.	Yes	–	–	Anaerobic strep.	Neg.	Endometritis, peritonitis, ruptured uterus	Breech with contracted pelvis	No. 3151 Autopsy Bl. culture, an. strep.
210	3 mo.	Yes	Yes	–	*Staph. albus* Anaerobic strep.	*Staph. albus*	Septicemia, endometritis, embolic pneumonia, pelvic thrombophlebitis	–	No. 3167
215	36 wk.	Yes	–	–	Anaerobic strep.	Neg.	Endometritis, peritonitis, thrombophlebitis, embolic pneumonia (extreme postmortem autolysis)	O.P.D. Premature stillborn	No. 3172

TABLE V—CONT'D

PATIENT'S HISTORY NO.	DURATION OF PREGNANCY	INFECTED BEFORE ADMISSION	ABORTION		UTERINE CULTURE TYPES OF ORGANISMS	BLOOD CULTURE TYPES OF ORGANISMS	EXTENT OF PATHOLOGIC LESIONS AT DEATH	CHARACTER OF DELIVERY	AUTOPSY
			CRIMINAL	SPONTANEOUS					
1766	5 mo.	Yes	–	Yes	*Strep. hemolyticus*	Neg.	Endometritis, peritonitis, pelvic abscess	Spontaneous	No. 3388
3447	Term	No	–	–	Nonhemolytic strep.	Nonhemolytic strep.	Septicemia, cerebral embolus, endometritis, bronchial pneumonia	Spontaneous breech (membranes ruptured 36 hr.)	None
5139	Term	Yes	–	–	None (culture of pelvic abscess-anaerobic strep. *B. coli*)	Neg.	Endometritis, pelvic abscess	O.P.D. Short labor	No. 3792
5298	5 mo.	Yes	–	Yes	Anaerobic strep.	None	Endometritis, peritonitis, appendicitis	Spontaneous	No. 3785
5915	38 wk.	? (Membranes ruptured 3 days before delivery)	–	–	*Staph. albus* Anaerobic strep.	Neg.	Endometritis, peritonitis	Cesarean section	None
6112	Term	No	–	–	None (peritoneal culture, an. strep., *Staph. albus*)	Anaerobic strep. *Staph. albus*	Septicemia, peritonitis	Spontaneous with retained placenta, supravaginal hysterectomy	None
6148	Term	No	–	–	*Staph. albus*	*Staph. albus*	Endometritis, septicemia	Cesarean section	None

TABLE V—CONT'D

1930									
8308	Term	Yes	–	–	*Strep. hemolyticus*	*Strep. hemolyticus*	Endometritis, peritonitis, local septicemia	Spontaneous	No
9155	Term	No	–	–	*Staph. albus*	Negative	Endometritis, peritonitis, general	Cesarean	Yes
1931									
4129	Term	No	–	–	*Staph. albus*	Negative	Endometritis, postoperative wound infection, emb. lung abscess. Lung abscess	Cesarean ruptured uterus	Yes
4668	Term	No	–	–	*Strep. hemol.* Gram neg. bac. Anaerobic strep. (autopsy)	*Strep. hemol.*	Peritonitis general, endometritis, septicemia	Low cervical section	Yes
12940	Term	Yes	–	–	*Staph. albus* (autopsy)	Negative	Endometritis, pe,itonitis, postoperative wound infection, pulmonary embolism	Low cervical section	Yes
1932									
13660	3 mo.†	Yes	Yes	–	Anaerobic strep.	Anaerobic strep.	Endometritis septicemia, thrombophlebitis	–	No
1933									
17229	2½ mo.	Yes	Yes	–	Anaerobic strep.	Anaerobic strep.	Endometritis, peritonitis, bronchial pneumonia	–	No
1934									
19761	3 mo.	Yes	–	Yes	Hemol. strep. *Staph. albus* Few anaer. strep.	Hemol. strep. *Staph. albus*	Endometritis, peritonitis, septicemia	–	Yes
20051	Term	Yes	–	–	Anaerobic strep. (autopsy)	Anaer. strep. (autopsy)	Endometritis, peritonitis, thrombosis of left ovarian vein	–	Yes

of this group of organisms, as it is indicative of the degree of proteolytic power of organisms found in the individual cases. From the study of this particular cultural characteristic, it seems possible to draw conclusions as to prognosis with a fair degree of uniformity, that is, usually the more proteolytic the organisms found, the more active and virulent the infection.

Our experiences with puerperal infection perhaps can be studied best by referring to the tables.

In reviewing Table I, it may be seen readily that anaerobic streptococci are by far the most frequent offenders in our series. Not only is this true for endometritis, but also for the other lesions and especially conspicuous in the etiology of thrombophlebitis.

The morbidity figure for puerperal infection, which is shown in Table II, is rather low. This means a case is considered one of morbidity when the patient runs a temperature of 100.4° F. on two successive afternoons in the first ten days of the puerperium. The percentage of morbidity here stated refers only to puerperal infection. A distinct improvement occurred after the use of vaginal instillations.

In Table III, the incidence of maternal mortality, due to puerperal infection in our own cases, is recorded, a total of 13 and only 3 in the last four and one-half years, the number of deliveries over this period of time being approximately 7,000. Eight of these deaths followed cesarean section.

Table IV lists the total number of fatal cases of puerperal infection, 31 in number. Of these, 13 were our own cases, the remainder having been infected before admission to the hospital.

Table V summarizes the bacterial findings in these fatal cases. We have noted that in the entire series, anaerobic streptococci were responsible for practically half of the cases. The high incidence of *Staphylococcus albus* infection was due to the fact that this organism was present in the hospital for a period of time. When the source of this infection was discovered, no more cases developed.

Table VI reviews our experience with thrombophlebitis over the ten-year period. Note only one fatal case since 1926.

TABLE VI. THROMBOPHLEBITIS

	ADMISSIONS	DELIVERIES	NO. OF CASES	AEROBIC BACTERIA	ANAEROBIC BACTERIA	MIXED BACTERIA	NEGATIVE CULTURES	MORTALITY
July 1, 1924, to Sept. 1, 1926	2,194	1,913	9	0	6	0	3	3
Sept. 1, 1926, to Jan. 1, 1930	5,385	4,494	6	2	4	0	0	1
Jan. 1, 1930, to Jan. 1, 1933	5,381	4,472	5	1	3	1	0	0
Jan. 1, 1933, to July 1, 1934	2,804	2,358	2	0	0	2	0	0

From a survey of this report, one can readily conclude that anaerobic streptococci play the predominant part in the etiology of puerperal infection, that their presence in the vagina of a large percentage of women at term indicates that the infection is endogenous

and develops only when conditions favor their growth. Infections which are due to ordinary pathogenic organisms, such as various strains of hemolytic streptococci and staphylococci, can be controlled by good obstetric technic. Schottmüller, whose experiences are entirely similar to this report, reviewing his experiences up to 1928, concludes that the control of infections from without is a less difficult problem than those which develop from organisms harbored by the patient herself. In conclusion, he makes the statement, "Heute muss es also heissen: Die Gefahr kommt weniger von aussen als von innen."

From our own experiences with vaginal instillations, it would seem that in the last eight years we have practically eliminated the serious cases of puerperal infection due to anaerobic organisms. Since 1930, there have been three deaths on our service, two of these due to *Staphylococcus albus* and one to a mixed infection in which the hemolytic streptococcus was the predominant organism.

This report completes a ten-year study which has been continued as a routine procedure and it has definitely confirmed all the contentions of Schottmüller. As these facts become more generally appreciated, and as we gain further knowledge concerning the etiology and treatment of this type of puerperal infection, the name of Hugo Schottmüller shall take equal rank with that of the great Semmelweis.

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Davis, Albert A.: Local Anaesthesia in Gynaecology, Brit. M. J. **1:** 636, 1935.

The author enumerates the disadvantages of general and the advantages of local anesthesia. He describes the technic of the latter for removal of external tumors and cysts, operations on the cervix, colporrhaphy, and pudic nerve block. While morphine-scopolamine narcosis is often employed as premedication for local anesthesia, he prefers nembutal, gr. 1½ on the night preceding operation and gr. 3 one-half hour before operation.

F. L. Adair and S. A. Pearl.

PELVIC INCLINATION*

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COMPARATIVELY little has been published on pelvic inclination, and the few pages devoted to this subject in the various standard textbooks of obstetrics all seem to have originated from the same source.

By inclination of the pelvis is meant the angle that the plane of the inlet makes with the horizon. With the patient in the erect posture, this is spoken of as the habitual inclination. Should one determine the inclination of the inlet in the recumbent posture using a method already described[1] and which will be referred to briefly in this paper, he need only deduct that angle from 90 degrees (Fig. 1). Whether inclination of any of the planes of the pelvis in the individual remains the same, or is altered after death, has not yet been determined. It is natural to suppose that the changes incident to, and following death, would alter inclination. This fact is mentioned because almost all observations heretofore pertaining to pelvic inclination were either based upon studies of cadavers where one can expose any portion of the pelvis, or in living subjects by noting the inclination of a line extending from the bottom of the spine of the last vertebra to the upper border of the symphysis. It may be stated that the external and the true conjungates seldom lie in the same plane.

The inclination of the plane of the superior strait has been variously estimated from 35 degrees by Levret to 75 degrees by Camper, and accepted by Cragin as averaging 60 degrees in accord with Naegele's determinations, which were made in 1819. The last named author measured the distance from the floor to the lower border of the symphysis pubis and to the tip of the sacrum, respectively. He then placed a normal pelvis in a similar position and estimated the inclination of its superior strait. Improved methods now at our command should overcome the apparent lack of interest and the neglect of opportunity for studying inclination as well as its relationship and effect upon the management of labor.

The practical importance of pelvic inclination attracted the attention of one of us (A. Y. P. G.) about eighteen months ago, when encountering a striking example in a pelvis of normal measurements that required cesarean section. Retrospection revealed some unfortunate cases, where knowledge of inclination might have had a very satisfactory effect.

*Read at the Forty-Eighth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, held at Skytop, Pa., September 16 to 18, 1935.

In view of his previous work along this line, the theoretical aspect of this study was delegated to Jacobs, who conducts "abnormal pelvis" clinics at Gallinger Municipal, Georgetown University and Garfield Memorial Hospitals. The Clinic at Garfield is under direct supervision of Garnett.

The obstetric inclinometer, devised by Jacobs[2] in 1928, made possible the study of pelvic inclination in living women. This instrument measures accurately the inclination of all the pelvic planes and the length of the important diameters. It makes possible the reproduction of a cross-section of the pelvis known as the pelvigram, and affords information desirable in the performance of accurate pelvic roentgenography. By careful observation of eighty symmetrical pelves of apparently normal individuals and aided by the use of the inclinometer and the lateral pelvic roentgenogram, Jacobs was enabled to establish the normal inclination of the pelvis and pelvic planes. The difference in the figures here

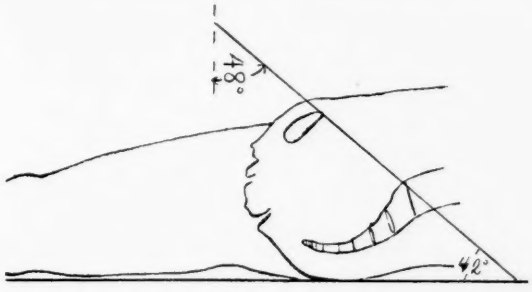


Fig. 1.—The inclination of the inlet is 42 degrees in recumbent posture. Should one deduct this angle from 90 degrees the habitual inclination (48 degrees) would be determined.

quoted, taken from his series and those of the pelvis that have been generally accepted as normal, are quite marked (Fig. 2), and give a better understanding of why one may encounter trouble in a pelvis of normal size due to faulty inclination, which had not been suspected. It appears that the old methods of detection were inaccurate, although it is possible that differences in manner of living, rickets, exercise, and other factors may have played a part.

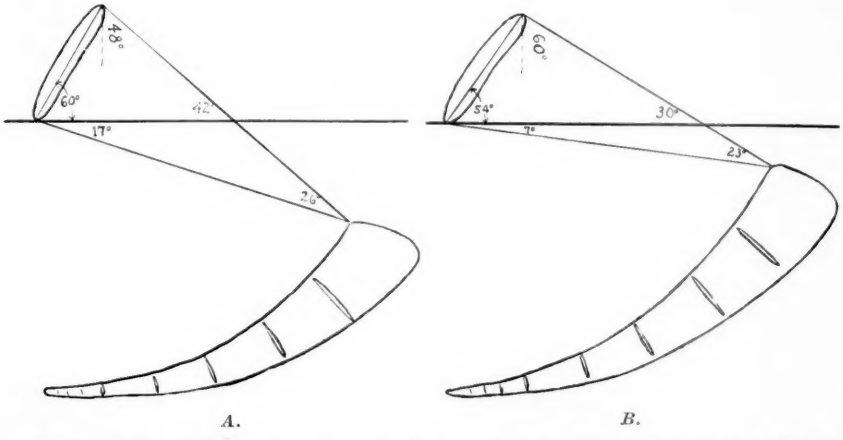
All of these patients were examined in the recumbent posture with legs extended and separated, being supported on tables specially constructed for the purpose. Although a difficult position in which to perform a pelvic examination, the inclination was thus obtained in the horizontal posture. This was selected as the standard position because changes in posture caused variations in inclination of the pelvic planes.

The average inclination of the inlet Jacobs found to be 42 degrees, as compared with 30 degrees accepted by Cragin (Fig. 2). The habitual inclination of the normal pelvis, therefore, is 48 degrees instead of the 60

degrees heretofore regarded as normal (Figs. 1 and 2). The inlet of the pelvis which Jacobs recognizes as normal is more conducive to engagement of the presenting part in any posture.

In the literature we find no indication of the average inclination of the symphysis. But by constructing a pelvigram, using the measurements accepted as normal, the inclination is found to be 54 degrees, as compared to 60 degrees in the average pelvis which we accept as theoretically accurate. The inclination of the symphysis varied between 44 degrees and 84 degrees in this study.

The fact that most obstetricians believe that in doing a pelvic examination in either the recumbent or lithotomy position, the promontory is felt above the level of the lower border of the symphysis, indicates that the inclination of the plane of the diagonal conjugate had seldom been observed in living women. The inclination of the plane of the diagonal



A. *B.*

Fig. 2.—(*A*) Pelvigram or cross-section of the average pelvis in a series of eighty living women. (*B*) Using the normal measurements and pelvic inclination as accepted by Cragin (30 degrees in recumbent posture), this pelvigram was constructed. It represents the pelvis heretofore regarded as normal and is merely hypothetic, as his figures were not taken from living subjects.

conjugate varied between minus five degrees and fifty degrees. The average was 16.7 degrees as compared to seven degrees in the pelvis formerly accepted as normal (Fig. 2).

Three cases were encountered where the promontory was situated above the lower border of the symphysis with the patient in the recumbent posture. In two the inclination of the diagonal conjugate was minus five degrees and in one, minus one degree. Cases of this type must of necessity have a faulty inclination of the inlet, and a correct prognosis so far as engagement and delivery are concerned is impossible (Fig. 3). In practically all women the promontory is situated below the level of the lower border of the symphysis, with, of course, more favorable inclination of the inlet. Even in pelves of moderate size when the inclination is poor it is unusually difficult to reach the promontory.

The inclination of the symphysis as related to the inclination of the diagonal conjugate is the major factor in determining the length of the true conjugate. For, included between these two diameters, because of its importance, is an angle designated as the obstetric angle. The three diameters together, namely, the true, the diagonal conjugate, and the symphysis pubis, form the obstetric triangle (Fig. 2). The average obstetric angle was 77 degrees as compared to 61 degrees in the pelvis usually accepted as normal. A small angle will subtend a small true conjugate, while a large angle will include a large true conjugate (Fig. 2).

Engagement of the fetal skull may fail to occur in cases of marked faulty inclination even though the pelvic measurements are ample. The posterior parietal eminence usually presents below the promontory, while

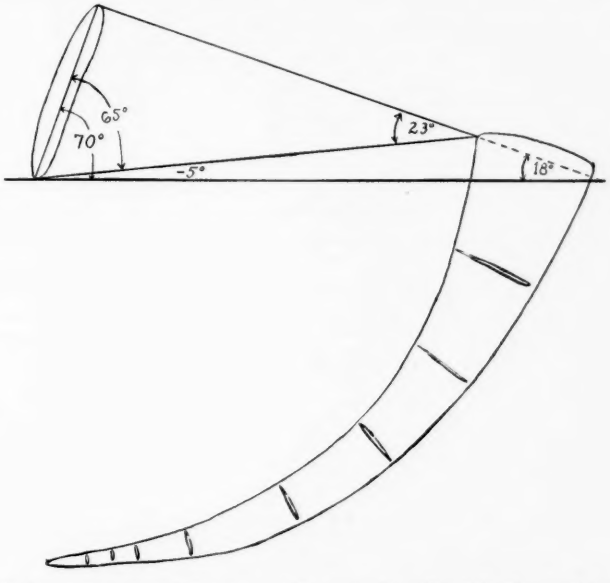


Fig. 3.—It is very unusual for promontory to be situated above the level of the lower border of the symphysis. Such cases present poor inclination of the inlet. Here inclination of the inlet is 18 degrees as compared with 42 degrees for the average.

the anterior parietal boss may be found protruding in front of the symphysis (Fig. 4). The longitudinal suture occupies the transverse diameter of the inlet, but in some cases the occiput may be slightly anterior or posterior, depending upon whether the available transverse diameter approaches the symphysis or promontory. Naturally, the amount of overriding depends upon the size of the head and the degree of inclination of the inlet. According to Sturmdorf[4] it is a fundamental law in dynamics that the direction of a given force or body impelled by such force, impinging against a resistant plane, becomes deflected in a fixed and definite direction, the degree of deflection being governed by the angle of the resisting or deflecting plane. In an abdominal cavity of normal skeletal configuration, a true vertical, in contact with the cen-

ter of the sacrovertebral promontory, will impinge against the inner face of the symphysis pubis at its lower border (Fig. 5). The sacrovertebral promontory is situated three and a half inches above the symphysis, so that the vertical line which represents the initial direction of the intra-abdominal pressure at the pelvic brim, passes over, not into, the pelvic cavity.

Engagement occurs by a movement of lateral flexion, whereby the posterior parietal eminence rises while the anterior parietal bone slips behind the symphysis (Fig. 6). This process takes a relatively long time and is usually attended with premature rupture of the membranes and

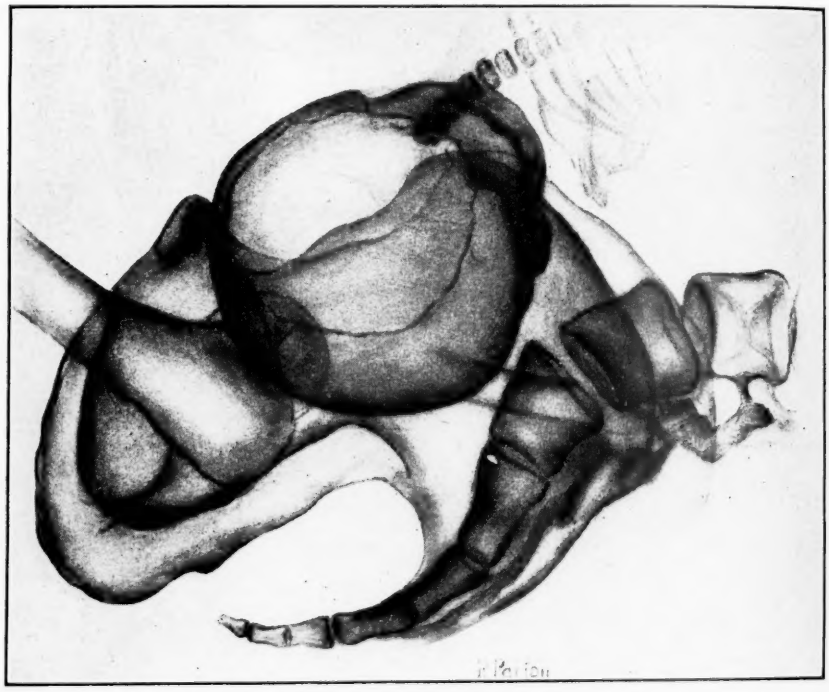


Fig. 4.—First step in process of engagement in pelvis with faulty inclination. Anterior parietal eminence protruded in front of promontory, while posterior parietal eminence is situated below sacral promontory. Longitudinal suture lies in the transverse diameter.

slow cervical dilatation. The sacrum usually flares backward, while the ischial bones flare outward, producing a wide arch. After passing through the brim labor progresses more rapidly, and by the natural mechanism. Any interference with lateral flexion, such as a posterior shoulder arrested above the promontory, a short neck, or in some cases of cord around the neck, may prevent engagement. Where the shoulders are directed toward one of the oblique diameters, there is rotation of the head through its vertical axis in addition to the movement of lateral flexion. Because of the tendency for engagement in the transverse diameter and

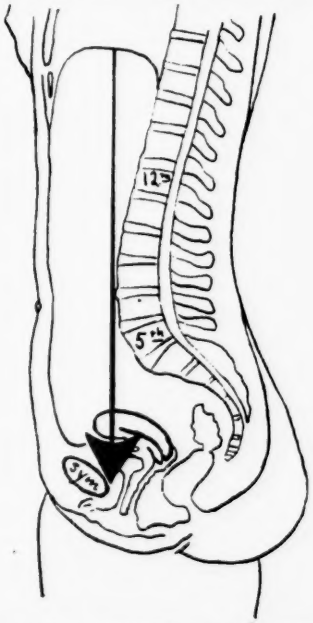


Fig. 5.—The direction of a body (presenting part), impelled by a given force (of expulsion), impinging against a resistant plane (symphysis), becomes deflected, the degree of deflection being governed by the angle of the resisting plane. (Illustration from Sturmdorf, Gyneplastic Technology, p. 102.)

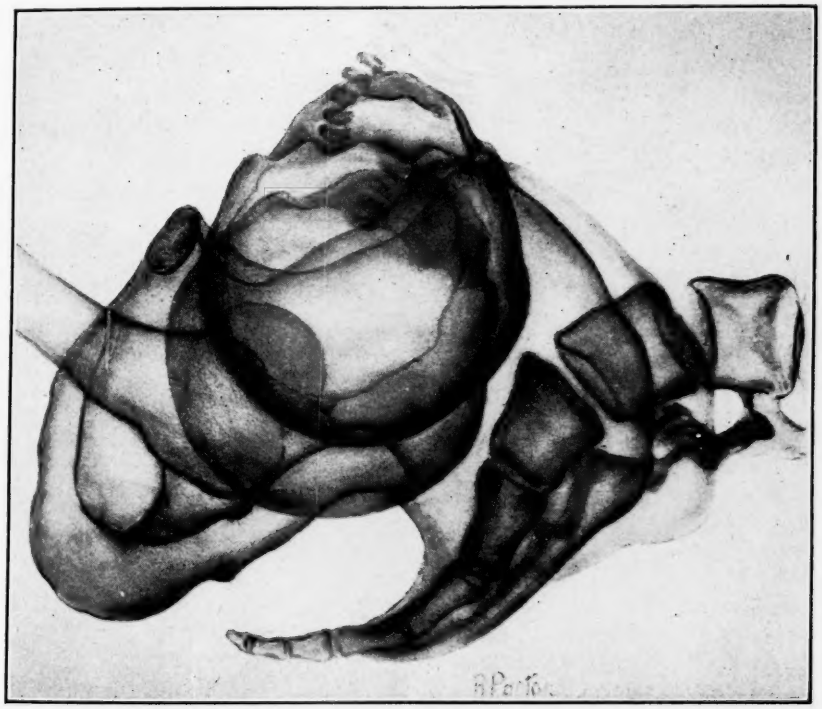


Fig. 6.—Engagement effected by lateral flexion, the anterior parietal eminence passing behind upper border of symphysis, while posterior parietal eminence slips above sacral promontory. After engagement labor progresses by normal mechanism.

the forward protrusion of the anterior parietal bone these cases are at times improperly classified as flat pelves, when in reality the condition may accompany any type pelvis. That many cases of "transverse arrest at the brim" are merely evidence of faulty inclination, may now be appreciated.

There are various practical ways of observing pelvic inclination for ready utilization.

1. A lateral view of the patient as she stands, will make evident an unusual lumbosacral angle or lumbar lordosis. Cases of this type usually present faulty inclination. The protruding lumbar vertebrae may obstruct the entrance of the presenting part into the brim.

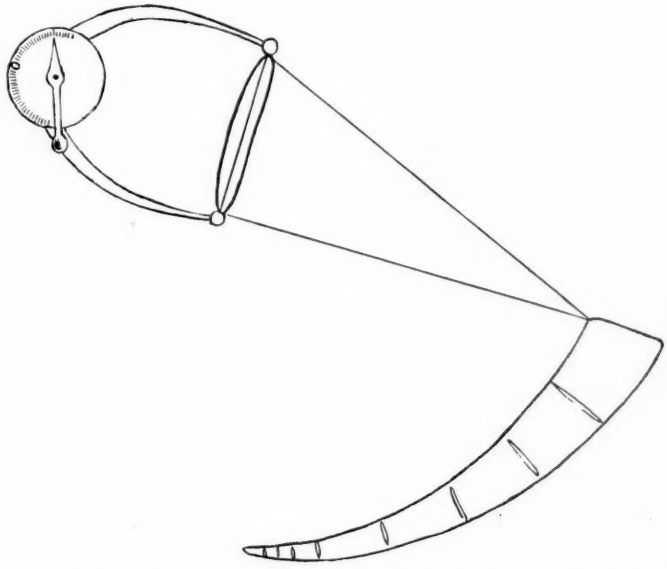


Fig. 7.—Measuring height and inclination of symphysis with obstetric inclinometer.

2. With the patient standing in the same position, place an index finger on the upper border of the symphysis and the other at the bottom of the spine of the last lumbar vertebra. Note the difference in station of the two fingers.

3. When measuring the external conjugate diameter, note the inclination or angulation of the pelvimeter.

4. Examine every patient as early as the eighth month of pregnancy and if the head is not engaged, try to push it into the inlet. If the inlet does not seem "available" and there is overriding because of faulty inclination, flex the thighs on the abdomen while attempting engagement.

5. The use of the inclinometer as previously mentioned.

6. The inclination of the plane of the symphysis is easily estimated by placing one finger on the upper and one on the lower border. A pelvimeter may be used in the same way. The inclination of the plane included between the fingers or ends of the pelvimeter is noted. For accurate and ready reading, the caliper of the inclinometer (Fig. 7) may be used.

7. The lateral pelvic roentgenogram, the merits of which Jacobs[5] has emphasized, is again discussed for two reasons: First, because of a modification in the technic

not yet published greatly simplifying the procedure, so that anyone with diligence can practice pelvimetric roentgenography and at the same time observe pelvic inclination as evidenced by the relationship of the inlet to the spinal column, as well as measuring the size of the head and estimating its ability to engage. Second, because the picture obtained as compared to other modifications that have been tried, is the clearest, and distortion and asymmetry are the least, if at all present.

METHOD

A modern x-ray table which rotates from the usual horizontal to a vertical position is used. The patient stands in her habitual posture with one side in apposition with the table top, and the film with Bucky diaphragm, which is incorporated in the

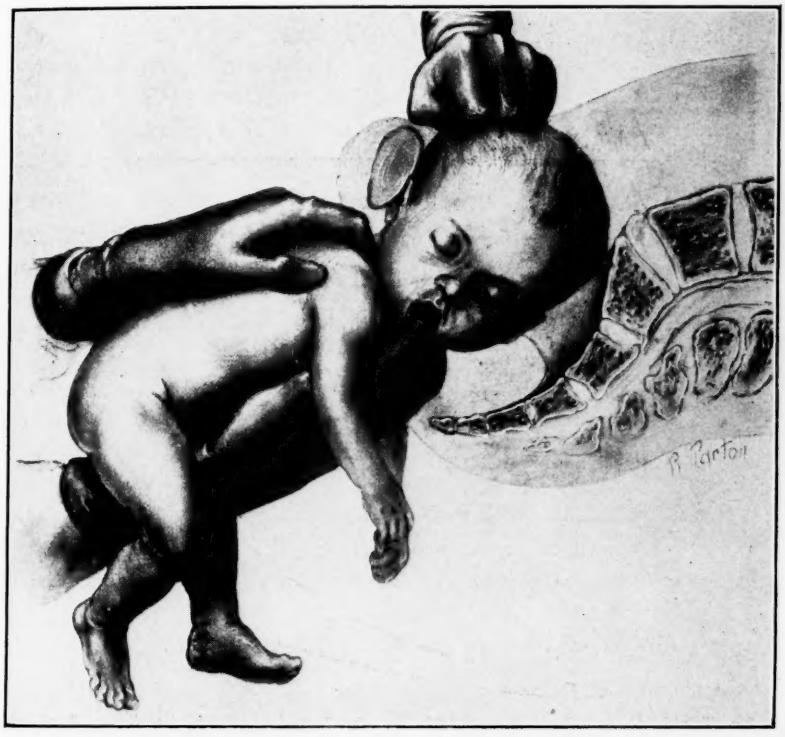


Fig. 8.—Faulty inclination of inlet may prevent engagement of the after-coming head. Backward pressure on anterior parietal bone frequently causes head to enter inlet.

table, is shifted to the proper height so as to include the desired view. The usual belt of canvas which the roentgenologist uses is placed in position, firmly securing the patient's hip to the table. The tube is so placed that the center ray reflected from the target, will strike a point one inch posterior to the anterior inferior iliac spine. This point, in practically all cases, denoted the middle of the true conjugate diameter, making the picture a suitable one from which to measure the length of the true conjugate accurately, when the dotted scale or method of Roberts is used.

Faulty inclination should be recognized before the onset of labor. Regardless of the degree of inclination, the patient should be given a test labor since acute flexion of the thighs improves the inclination of the inlet as well as the symphysis pubis, this attitude should be encouraged during labor. Lying on either side with

the legs completely flexed, or assuming a squatting posture, also favors engagement. At the height of several pains the legs may be flexed on the abdomen while the obstetrician pushes the overriding head in the direction of the sacral promontory in an effort to cause engagement by favoring lateral flexion. Or, with the patient in the same position pressure may be made downward as by Leopold's fourth maneuver. The Walcher position is of no value in these cases because it exaggerates the condition by producing a more unfavorable inclination. If, after a fair test of labor, the head seems incapable of the necessary lateral flexion and engagement fails to occur, as manifested by lateral roentgenograms taken during the course of labor, a cesarean section should be done, for delivery from below would be dangerous to the mother and child. In the event that the patient is not seen until late in labor

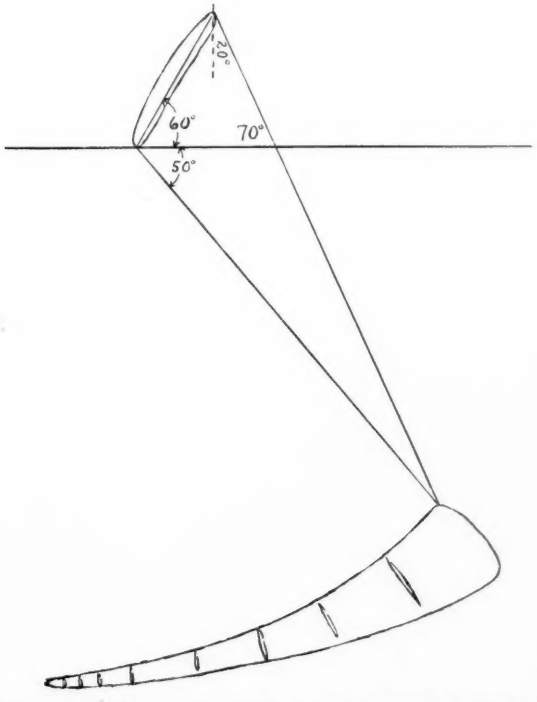


Fig. 9.—The inlet is almost perpendicular to the forces of expulsion, facilitating engagement. This is an abnormally favorable inclination.

and delivery with forceps attempted, a cephalic application must be made, and traction should be directly downward. Should version and extraction be the method attempted, the head must come through the inlet in the transverse diameter, and backward pressure applied on the anterior parietal bone to effect engagement as described for the treatment of vertex cases (Fig. 8).

CASE REPORTS

The pelvis of marked abnormal inclination is not common, yet we have encountered several where such knowledge proved of great benefit. Three good examples are here referred to, although several more have been seen. It is expected that they will be detected readily and frequently in

the future. Such abnormal cases were not included in the series of eighty cases used for the purpose of determining the inclination of planes in the average pelvis.

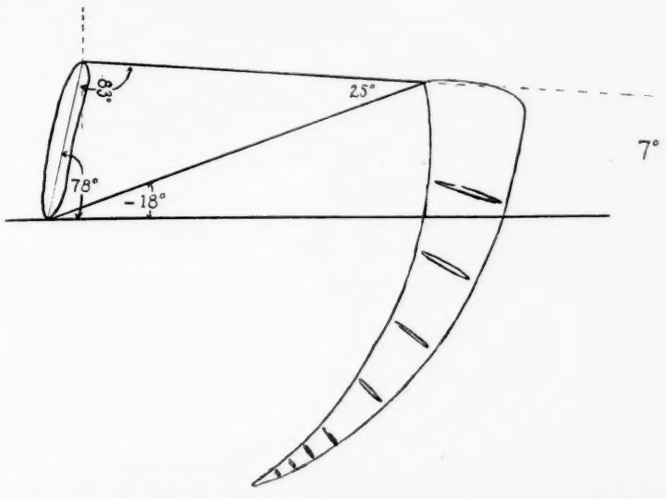


Fig. 10.—The most unfavorable type of inclination. The forces of expulsion have a tendency to drive the presenting part over the symphysis instead of into the inlet. (Postural treatment enabled this patient to deliver normally.)

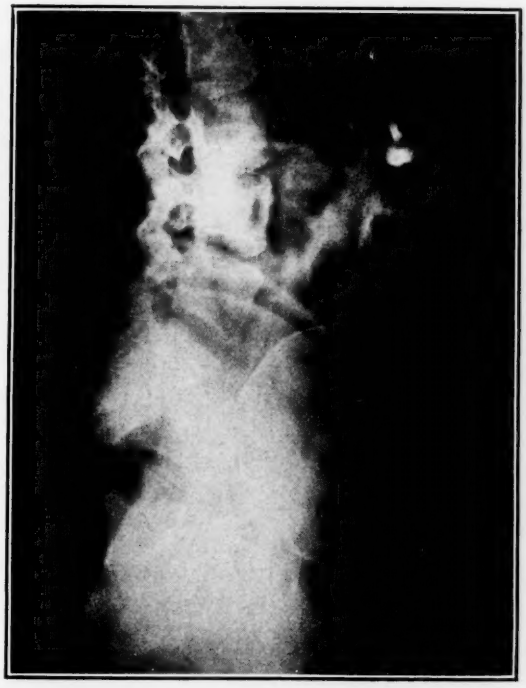


Fig. 11.—This roentgenogram shows faulty inclination of inlet. Engagement failed to occur and cesarean section was performed.

1. The most favorable inclination noted was seventy degrees in the recumbent posture and twenty degrees in the standing posture. In either position early engagement can readily occur (Fig. 9).

2. The most unfavorable inclination was found in a primipara who had had infantile paralysis in childhood. The inclination of her inlet in the recumbent posture was seven degrees. In other words, the plane of the inlet was almost continuous with the spinal column. Although she had a bad inclination and pelvic contraction, her legs were flexed sharply on the abdomen and a six pound, seven ounce baby was delivered normally after a short labor (Fig. 10).

3. This case demonstrates the value of an accurate lateral pelvic roentgenogram (Fig. 11). Lateral flexion to effect engagement failed to occur after test of labor, and cesarean section was done.

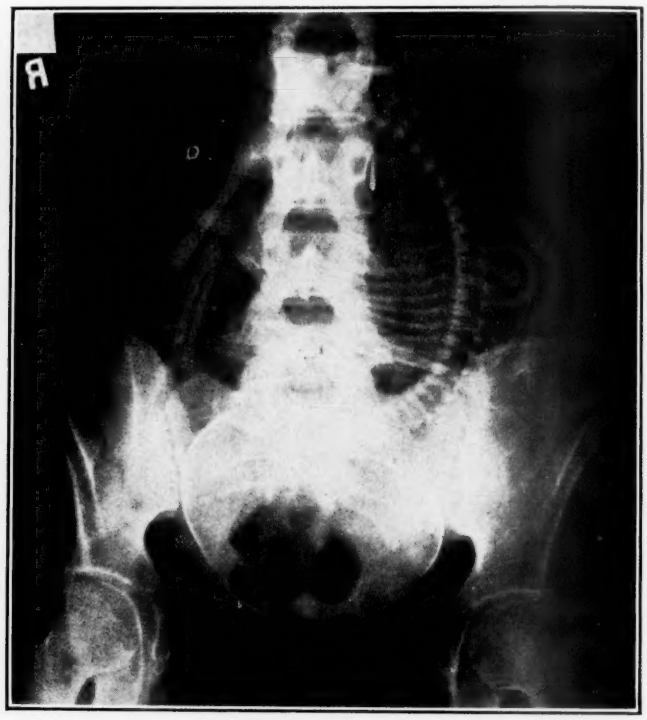


Fig. 12.—Same case as Fig. 11. Flat plate picture misleading. What appeared to offer a favorable prognosis for normal delivery required cesarean section.

The fallacy of an ordinary flat-plate picture taken of this case in determining engagement by obscuring a marked faulty inclination is clearly shown in Fig. 12.

SUMMARY

1. The habitual inclination of the pelvis as well as that of the inlet in recumbent posture has been determined in a series of living women for the first time. These figures are not in accord with those generally accepted.

2. The importance of the obstetric angle is emphasized.

3. The inclinometer and x-ray afford absolute knowledge of pelvic inclination.

4. Fortunately exaggerated forms are not common, but they should be readily recognized and accurately studied.

5. Several easy methods of noting inclination are enumerated.

6. The rôle of inclination in the mechanism of engagement and delivery is discussed.

7. The practical value of postural variations in labor is considered, as well as the application of pressure in the proper direction to the overriding head.

8. A plea is made for the test of labor.

9. Failure to engage because of faulty inclination when treated with forceps or version often ends disastrously. Cesarean section should be seriously considered.

10. Preliminary reference is made to a simple, clear, accurate, and inexpensive method of lateral pelvic roentgenography for studies of habitual inclination and mensuration.

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DISCUSSION

DR. LUCIUS A. WING, New York, N. Y.—The work that Dr. Garnett has brought before us is timely in view of the active interest existing at present in pelvic studies made possible by roentgenologic methods. I have not used Dr. Jacobs' inclinometer, and my experience with this entire subject has been largely from the side of clinical obstetrics. At the New York Hospital, however, several of us have been working for the past year with the precision stereoscope devised by Dr. Caldwell and Dr. Moloy. We have been impressed with its value as a means of arriving at a more accurate conception of the variations in pelvic conformation.

Lateral roentgenograms under proper conditions, as Dr. Garnett has indicated, show that considerable variation exists in the inclination of the pelvic inlet. The steepest inclination is observed in the type of pelvis classified by Caldwell and Moloy as the anthropoid type. In this type of pelvis the sacral promontory lies at a high level in respect to the upper border of the symphysis. The latter is deep and wide in this type of pelvis. In the android or masculine type the pelvis is deep with side walls which often converge, and the inclination of the plane of the inlet is not characteristic as in the anthropoid type. Usually the top of the symphysis and the sacral promontory are more nearly on the same plane.

Many abnormal labors occur in these two types of pelves, therefore their recognition is important. As in the case which Dr. Garnett has reported, the inclination of the pelvic inlet may well influence engagement of the presenting part, especially if the pelvic type is unfavorable or if any disproportion is present.

DR. LEROY A. CALKINS, Kansas City, Mo.—Dr. Garnett has told us exactly how to estimate the pelvic inclination, but he still has not told us how we may then

anticipate what will happen in that patient's labor. Perhaps that is asking too much from his present series of cases, because, quite obviously, it will require a large series before one can make predictions.

DR. A. J. RONGY, NEW YORK, N. Y.—A wrong pelvic inclination may influence the course of labor, but that does not quite explain the underlying principles associated with the various degrees of dystocia. Labor to start normally, and for the head to progress through the pelvic basin, depends first upon how the pivotal points of the passenger and the passage come into contact. The propelling forces exert pressure upon the fetus through a definite axis, and when that axis is not dislodged labor will progress normally. The normal axis is maintained when normal points of contact are established between the fetus and the pelvic basin. The point of contact in the fetus is the highest point of the occipital bone. The point of contact in the pelvis is on the highest point of the posterior surface of the pubic arch. These two points of contact must have a definite relationship before labor can start normally.

The mechanics of labor must be conceived as a head passing through the pelvis in a corkscrew manner, not as heretofore interpreted, as a head in changing positions, such as flexion, rotation, and extension. The position the head assumes in the pelvis is forced by virtue of this corkscrew process.

From a clinical standpoint the course of labor will depend upon the position of the fetal neck in its relation to the pubic arch. The further the fetal neck is removed from the pubic arch the greater will be the dystocia. This is why a head in the mentoposterior position cannot deliver itself spontaneously, nor can it be delivered by forceps. The reason that a head in the mento-anterior position may deliver itself spontaneously is that the farther the head progresses in the pelvis, the nearer the fetal neck approximates the pubic arch.

It is this conception of the mechanics of labor that helps us to predict whether labor is going to be normal or abnormal. In the average patient it is not the size of the fetal head nor the measurement of the pelvis that is important, but it is the manner in which labor begins and how closely the fetal neck and the pubic arch are approximated, because upon this depends whether the larger part of the fetal head will become engaged in the pelvis during any stage of labor.

DR. J. BAY JACOBS, WASHINGTON, D. C.—Dr. Garnett's purpose of presenting this paper was, of course, to emphasize the importance of the practical application of the study of inclination. For many years I have been very much interested in this subject and have devised the obstetric inclinometer for the purpose. My study of 80 cases, referred to in this paper, enabled me to determine the average inclination of the pelvis in living women. This I have found to be 42 degrees in recumbent posture, instead of the 30 degrees quoted by Cragin.

Dr. Garnett has tried to determine whether or not pelvic inclination affected delivery in any manner. He does not, however, try to create the impression that if the pelvic inclination be known, one may predict just how the patient will deliver. One should be able to detect pelvic inclination readily in the average case. For instance, should the patient stand alongside of you, notice whether there is any lumbar lordosis. If so, you immediately suspect that the symphysis is below its normal level and that the inlet approaches the line of the spinal column. This would necessitate the head's taking a right angle turn to enter the pelvis. On the other hand, should the inlet be rather perpendicular to the spinal column, whether the patient be standing or lying down, engagement is readily effected.

Dr. Garnett does not convey the idea that every patient with a faulty inclination should have a cesarean section. For example, I have recently delivered the case referred to in Dr. Garnett's paper, of the woman who had had infantile paralysis, and who had the most abnormal type of pelvic inclination. To determine the effect of postural application during labor, her thighs were acutely flexed upon the abdomen, the head readily engaged and spontaneous delivery resulted. On the other

hand, one may encounter cases of more favorable inclination that will not respond so nicely to postural treatment during labor.

Dr. Garnett calls attention to the various simple methods which we routinely use, for learning pelvic inclination in any case. To determine the inclination in a technical manner necessitates the use of the obstetric inclinometer, and with this instrument the height and inclination of the symphysis and the length and inclination of the diagonal conjugate would be noted. A pelvigram is then drawn, as explained in my previous articles, and instantly, with the aid of a protractor, the inclination of the inlet would be recorded accurately. I wish finally to call attention to two facts. First, that in my study of 80 pelves of living women, I have found that the average inclination is more favorable than heretofore recognized; and, second, that the size of the true conjugate in the average pelvis is larger than the previously accepted true conjugate (as related to the length of the diagonal conjugate). Thus a more favorable inclination, and a larger than expected true conjugate, account for the preponderance of normal deliveries in borderline pelves.

DR. W. A. SCOTT, TORONTO, CANADA.—I would like to ask Dr. Garnett just at what time during pregnancy his measurements of the pelvic inclination were taken? At our clinic Dr. Goodwin some years ago devised a pelvimeter and has been taking measurements on a considerable number of patients. He advises that during the progress of pregnancy the pelvic inclination changes very markedly, as much as 17 degrees sometimes. I wondered whether Dr. Garnett's measurements were taken only at one particular time.

DR. WILLARD R. COOKE, GALVESTON, TEXAS.—Attention may be called to faulty inclination by the fact that in cases with normal measurements engagement fails to take place in the way one expects. Very often where the pelvis is normal, flexion of the spine to bring the pelvis into line will permit the engagement of the head, which might not otherwise be possible. It is very commonly necessary to do this in order to shorten the inlet stage of labor. It might be regarded as a part of the test of labor in borderline cases. With the patient in the Walcher position the inclination of the pelvis will be made worse. The reverse of the Walcher position will often bring about engagement and descent through bringing the upper part of the axis of the pelvis into line with the thrust, in spite of a possible slight reduction in the anteroposterior diameter of the inlet.

DR. GARNETT (Closing).—I wish to stress the importance of having the patient in the correct position and also the importance of proper manipulation to overcome the difficulty encountered by faulty pelvic inclination.

On account of the impossibility of making a correct prognosis in these cases, I wish also to urge a test labor, because by manipulation and correct position the majority of these cases can be handled successfully.

The eighth month is the safest time to start to estimate inclination and decide the possibility of successful manipulation at the time of birth. It is impracticable to take pictures in all cases as a routine measure, so accurate pelvimetry is out of the question. The x-ray is, however, important and careful study should be made before labor starts if any suspicion of abnormal inclination has been aroused by the simple rules suggested.

I was asked to see a patient recently by one of the junior men of the staff. The woman had been in labor for twenty hours, and he could not understand why the head would not engage. The membranes had been ruptured for several hours. She was found to have a very badly inclined pelvis. We flexed the thighs as tightly as possible, and the head was pushed backward against the promontory. It slipped through and the baby was born in twenty minutes. If, after manipulation and position, the head does not properly engage, the woman should not be subjected to traumatic delivery, but a cesarean section should be performed.

OCCIPITOPOSTERIOR POSITIONS*

S. A. Cosgrove, M.D., F.A.C.S., Jersey City, N. J.
(From the Margaret Hague Maternity Hospital)

A VERY cursory examination of the American literature alone, for the past three years, shows many contributions on this subject, and the frequency with which it occurs attests to the very real problem it constantly presents to the obstetric practitioner. The same fact connotes a fundamental misconception. Some writers seem to believe that this abnormality constitutes a complete entity and is a dystocia in itself, beyond which they need not go in estimating the particular situations in which it appears. They consider only the effect and lose the significance of the cause.

A brief review of the mechanism of normal labor and of the etiology of these positions, and the fact of their frequent spontaneous evolution, show the fallacy of thinking of the condition in terms of a well-rounded, distinct entity, apart from other factors of dystocia and will perhaps bear very materially and helpfully on the management and treatment of this troublesome difficulty.

In whatever relation the occiput enters the inlet, internal rotation, swinging of the occiput to a directly anterior position from an obliquely anterior, a transverse or an obliquely posterior position, does not take place at the plane of the inlet, but is delayed until the head descends through the pelvis, and is in relation to the bony outlet thereof. Many times it occurs only after the head has presented in the vulva, and has distended the introitus of the vagina. This occurrence of internal rotation late in the succession of phenomena constituting the mechanism of labor must be remembered with reference to the management of posterior positions.

An attempt to correlate statistics of the incidence of posterior positions is hopeless. The average as exhibited in the German literature is as low as 1 to 1½ per cent, while American statistics run from 11.68 per cent to 30 per cent, with the average probably about 20 per cent. In 15,000 consecutive cases at the Margaret Hague Maternity Hospital the incidence was only 5.1 per cent. It, of course, is realized that this is far below the *primary* incidence for, as Williams points out in relation to his service, many of our admissions are received too late to note the primary position. Besides, our routine use of rectal examination in labor further militates against accuracy of diagnosis of primary relationship.

*Thesis for admission presented at the Forty-Eighth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons held at Skytop, Pa., September 16 to 18, 1935.

The incidence of persistent or arrested posterior positions is also variously reported. All authorities do agree, however, that "a great many" or a majority of primary posterior positions will rotate spontaneously, so that the proportion of them which remains persistent is relatively small, the estimations varying from 20 per cent to 40 per cent of the total. In the series of 15,000 cases referred to above it was 65 per cent. As, however, this is based on a total incidence observed at various stages of labor, rather than on *primary* incidence, its relation to the latter would be very much smaller. In a personal series of 4,810 cases it was 38 per cent.

The etiology of primary occipitoposterior position is not clearly understood. The variety of factors which different writers have stressed from time to time as most important, and which all authors admit as possibly contributing causes, exhibit a lack of unanimity of opinion. There is general unanimity, however, as to the importance of *gross* deviations from normal of the bony pelvis in determining occurrence of both primary and persistent occipitoposterior positions. Thoms stresses relative or actual diminution of the transverse diameter of the inlet and Caldwell and Moloy state that this type of deformity as exhibited in their "android" pelves *necessarily* tends to cause posterior engagement; many authors mention funnel pelvis as interfering with spontaneous rotation; Vaux recognized definite pelvic contraction in 74 per cent of occipitoposterior positions; Hanson in 70 per cent; Caldwell in 30 per cent, and I found 30.9 per cent in my private series; other writers note the importance of deflexion of the head in the etiology, but deflexion in turn depends on such pelvic asymmetry as disturbs the equality of pressure on the ends of the occipitosincipital lever.

But besides these grosser bony abnormalities, if such intangible factors as variation in torsion of the uterus; modifications in flexibility of the head, posture of the fetus in utero, tone of the abdominal wall, and many others, may be conceded as determining departure from normal, it may be just as readily conceived that very slight and perhaps equally intangible deviation in pelvic bony symmetry or in cephalopelvic proportion, are of even greater importance. In this connection, Thoms says: ". . . . There are many slight or moderate variations from the normal which remain unrecognized." So that I am led inevitably to the conclusion that the primary occurrence of occipitoposterior position, as well as its abnormal persistence, necessarily implies the existence of some degree of bony pelvic asymmetry, or deformity, or cephalopelvic disproportion.

If such bony asymmetry or disproportion is of slight degree only, involving entirely, or most importantly, the inlet of the pelvis, one would expect that in spite of the relatively unfavorable relation of the head to the inlet, it would be capable of spontaneous evolution in its passage

through a normal or not too badly distorted outlet. Clinical experience proves that this expectation is valid, because as already shown, the great majority of cases are capable of spontaneous delivery.

By logical extension of this conception, if spontaneous rotation does not occur and the vicious position is persistent, the failure to rotate must depend on more definite asymmetry or disproportion than that which has determined primary malposition in those cases which rotate spontaneously.

Again clinical experience bears this out as developed earlier in the paper. I believe, therefore, that the occipitoposterior position is not necessarily and per se, a definite pathologic entity. If it becomes pathologic by reason of its persistence, that pathology is constituted not only of the vicious position but most important, of some degree of pelvic anomaly or cephalopelvic disproportion which coexists therewith. The problem of management must be predicated upon the existence and nature of this bony pelvic dystocia, rather than primarily upon the vicious position caused thereby.

It therefore follows that the most important phase of the management consists in competent antenatal estimation of the pelvis by careful thorough examination of pelvic types and proportions in relation to the size of the fetus. This estimation of pelvic adequacy should take account not only of the inlet, but of the midpelvis and outlet, for deviations from the normal in all of these planes may contribute to difficulty. Roentgenology should be increasingly utilized in making these estimates. The value of the contributions of Thoms and many others to the roentgenologic study of the pelvis should be acknowledged; the work of Caldwell and Moloy in defining factors of abnormality, and the clinical details aiding in their recognition, and their effort to place their roentgenologic identity on a plane of direct quantitative accuracy, have been most stimulating and salutary. Wider use of the advantages offered by the advanced work of many observers will materially enhance general results. In our own clinic definitive effort is made to critically estimate every pelvis before the patient goes into labor.

If such estimation shows an approximately normal pelvis and an approximately normal child, little disquiet need be caused by the occurrence of posterior positions of the head at the inlet, because prognosis for spontaneous rotation is good.

If, however, the pelvis is recognized as so abnormal as to make the prognosis for normal delivery dubious, then the occurrence of an occipitoposterior position must be recognized as contributing an additional factor of dystocia, and increasing the hazards for mother and child.

The vicious position itself may generally be recognized by abdominal palpation before the onset of labor and attempt to correct it made. Postural treatment has been suggested as useful, and Watson is en-

thusiastic as to the value of a pressure pad so bound or strapped against the anterior shoulder as to rotate it toward the opposite side, thus turning the whole fetal ellipse, including the head, to better relationship with the inlet. He makes the extreme statement that he has not failed in success by this method. If other experience bears out his success, the value of so simple a device should be recognized, and it should be universally employed. If my own enthusiasm does not match his, I must perhaps plead guilty to insufficient diligence in its use.

The treatment after labor has commenced serves to distinguish two trends of thought, the more conservative one shared by the majority of writers, and a more radical one, of which perhaps Arthur H. Bill is the best-known exponent. Certain of the premises of the latter are incontrovertible. He says that it is equally faulty to interfere too early, i.e., in the first stage of labor, or to wait too long after full dilatation of the os for spontaneous rotation to occur. This statement might well be generally subscribed to. It is in the definition of "too early" and "too long" that the divergence between radicalism and conservatism may be discerned. That Bill is relatively radical is revealed in his caution in stating that he offers his scheme of management for trained obstetricians only, and not as "a compromise of ideals to suit the methods which are within the resources of physicians unfamiliar with obstetric procedures or without . . . the judgment essential to proper application of methods." He claims extreme conservatism in the first stage, but finds that "In a very considerable percentage of these cases the fetal head . . . still remains unengaged at the beginning of the second stage" and in all such cases is constrained to perform internal podalic version, utilizing this procedure in 63.4 per cent of his occipitoposterior positions. He not only advises operative interference after only one hour of second-stage labor, but says that personally he does "not wait at all for spontaneous rotation after the os has become fully dilated." Thus he accepts a forceps incidence of 34.4 per cent and scarcely over 2 per cent of his babies presenting initially in occipitoposterior positions escape extraction with forceps or by the feet. He shows the remarkably low fetal mortality of 1 per cent, but as this is in a series of what he calls "normal" pelves, and as he admittedly allows no chance, even in normal pelves, for spontaneous rotation to occur, he definitely places himself at variance with the majority of writers.

In contrast to the radicalism thus exemplified by Bill, and others far less cautious and dextrous than he, Burger says that when the head is in occipitoposterior position at or above the plane of the inlet the only correct attitude is careful observation and expectancy. Danforth insists that interference is not to be carried out until the head is well into the pelvis and moulding has occurred. Calkins, Litzenberg, and Plass review the matter of prolongation of labor by occipitoposterior

positions, and find it to average, even in primiparas, not much more than two and one-half hours. They say that more frequent reiteration of the fact that some prolongation of labor is naturally to be expected in these positions might well increase our equanimity in managing them. Certainly such average prolongation as they demonstrate hardly warrants the necessity for universal operative interference. I would like to reiterate that where labor is unduly prolonged, the prolongation depends not on the posterior position, but on the definite bony dystocia which must, in these cases, coexist in a causative relation to the malposition. Williams says that many American writers, "being led astray by their fears, have failed to realize what nature can accomplish," whereas he himself regards posterior positions with equanimity provided the pelvis and child are normal in size. He therefore does not believe in interference except where forceps are necessary for other indications. De Lee also stresses the frequency of spontaneous anterior rotation, and says that watchful expectancy is the treatment until an indication for interference arises. Vaux reserves interference until the head is well engaged or descended into the pelvic cavity, and for at least two hours after completion of the first stage. Our own practice is eminently conservative. Results in 366 persistent posterior positions out of 4,810 private cases quoted give no maternal deaths and a gross fetal and neonatal mortality of 5.2 per cent. In 499 persistent posteriors out of 15,000 public cases there were no maternal deaths and 6.2 per cent newborn and neonatal mortality.

Correction of these totals by deduction of 15 premature fetuses of less than twenty-eight weeks, of 2 cases of spontaneous abruption of the placenta, of 5 fetuses dead before labor and macerated at birth, of 10 babies manhandled before admission, so that 3 were severely traumatized and 7 were killed, gives 2.7 per cent in the private series and 2 per cent in the public. These compare favorably with the 3.1 per cent corrected fetal mortality from the general service of Bill's own institution, handled not so radically as he does his own, but with a general tendency toward the early interference which he favors.

One other principle of first stage management which is most important is the relief of pain. It is indicated by every consideration of humanity and good practice. It conserves the strength and well-being of the mother as nothing else does, and, if used judiciously, does not injure the baby. The use of agents for this purpose should be commenced early. Bill appropriately states that the indication for their use should be subjective and not objective. I wish that there might be emblazoned on the walls of every delivery room, and impressed deeply in the consciousness of every student and practitioner Bill's words: "A certain amount of dilatation of the os is not deemed essential as an index of the time to

start analgesia. The fact that a patient *has pains which hurt her* is sufficient, regardless of dilatation."

There remains to discuss the nature of vaginal interference in the persistent cases in the second stage. I would not have you assume that all of the difficult cases must be so handled. If the scheme of careful prenatal estimation of prognosis which has been described is carried out, 6 to 8 per cent will appropriately be handled by elective cesarean section for bony dystocia, thus eliminating the least promising cases from the necessity of choice of vaginal delivery. About one-half of 1 per cent, in spite of such prenatal study will advance well into the second stage before their seriousness is appreciated, and may then require necessitous section, perhaps of the extraperitoneal type.

The others then offer a good prognosis to mother and child by some type of vaginal operative delivery. Because of the policy of extending conservative treatment well into the second stage, internal version is but rarely indicated and was used in my series in only 4 per cent. The vast majority of the remainder were delivered by one of two methods, i.e., manual rotation with forceps extraction or forceps rotation and extraction. It is not my intention to didactically indicate any one procedure of general choice. I believe that in any individual's hands, that procedure which by training and experience is most facile to him is best for his use. I have used both these methods extensively, but there has been evident an interesting change in choice of them. I first used the Kielland forceps ten years ago, but was not overwhelmed with enthusiasm for it and was rather reluctant to recognize its advantages. Its value has been more and more impressed on me with greater experience, and I have used it increasingly, as exhibited in Table I.

TABLE I

	MANUAL ROTATION FORCEPS EXTRACTION	FORCEPS (OTHER THAN KIELLAND) ROTATION AND EXTRACTION	KIELLAND FORCEPS ROTATION AND EXTRACTION
Prior to 1925	42.5%	27.4%	0%
1925-1929	24.1%	32.6%	15.6%
1930-1934	24.1%	24.1%	19.6%
15,000 public cases 1931-1935	5.0%	19.0%	28.0%

There has been a sharp drop in manual rotation in favor of total forceps rotation, and a progressive increase in the use of the Kielland forceps in preference to other types. I now believe that this instrument represents the best expedient for artificial rotation, and this opinion is evidently shared by my colleagues in charge of the public service, for in their hands manual rotation has dropped to a negligible use, while that of the Kielland constitutes a considerable majority of forceps procedures.

SUMMARY

1. The great variation in statistical estimates of both primary incidence and persistence of occipitoposterior positions is shown by selections from the literature, and by two series of cases herewith presented.

2. It is shown that both the occurrence and persistence of this condition depend on bony pelvic deformity or cephalopelvic disproportion.

3. It is this causative and concurrent *pelvic* dystocia which renders a certain proportion of occipitoposterior positions seriously pathologic.

4. Management must be predicated primarily on this associated pelvic dystocia.

5. Details of management are discussed in relation to the prenatal period, the first stage of labor, and the second stage of labor.

6. The specific value of the Kielland forceps is discussed.

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Te Groen, L. J.: Sterility, South African M. J. **9:** 145, 1935.

In a presidential address the author lists the social problems, such as sterility, birth control, and abortions, that confront the general practitioner in his work. He feels that the medical profession must take a lead in these problems rather than abide by the narrow outlook of the law.

Investigation of the causes of sterility in the male and the female and their treatment are discussed. The semen examination in the male and the tubal patency tests in the female are described.

F. L. Adair and S. A. Pearl

OUT-PATIENT OBSTETRICS*

A Review of 6,863 Cases

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(From the Service of the Chicago Maternity Center and the Department of Obstetrics and Gynecology of Northwestern University)

THIS report, which is a comprehensive review of all the work done at the Chicago Maternity Center since its inception on July 1, 1932 to June 30, 1934, is comparable somewhat to the type of obstetric practice found among general practitioners and obstetricians who do most of their confinements in the home. Therefore, statistics of this type, inasmuch as they approximate a cross-section of the obstetric practice in the United States, may be used as a standard of comparison for the general practitioner and the occasional obstetrician.

To be better able to appreciate this striking similarity and to evaluate the report properly, a brief description of our set-up with its numerous handicaps will be necessary. The Chicago Maternity Center was primarily organized as an endeavor to elevate the standard of obstetric teaching and practice while delivering indigent women in their own homes. It is readily apparent that we function in only the poorer districts of Chicago and the homes are usually of the worst type in which to do good aseptic obstetrics. Oftentimes our doctors are compelled to work without the aid of hot water, heat, or even light, and the sanitary conditions are indescribable. The medical personnel at the Center is comprised of three distinct but cooperating divisions: The internes, who are in absolute charge of their cases, are graduates of only Class A schools, and have completed at least one year's interneship in some good general hospital. I wish to emphasize the fact that the interne is in complete charge of his case until superseded by a resident or attending obstetrician. Accompanying the interne on all cases is an undergraduate medical student from one of the universities in the Middle West with whom we are affiliated, and also by a nurse, either an undergraduate from an affiliate hospital or a postgraduate who is in the process of training for an obstetric career. The reason for emphasizing these salient facts is to show the type of work that can be turned out by young doctors under, seemingly, insurmountable obstacles, if they are properly supervised. No deliveries are done at the Center itself. This building is used as a central depot for registration of patients, as well as for ten prenatal, one venereal, one toxemic, one cardiac

*Read before the Chicago Gynecological Society, May 17, 1935.

and two gynecologic clinics. It is true that without the splendid cooperation received from the Chicago Lying-in, Cook County, and Sarah Morris Hospitals the maternal and fetal mortality might have been higher.

In the two-year period from July 1, 1932 to June 30, 1934, we handled 6,863 confinement cases and 167 abortions of various types in the patients' homes. In 6,537, or 95.3 per cent, of these cases the deliveries and the postpartum periods were completed in the home; the remaining 326, or 4.7 per cent, were sent to a hospital because of some complication threatening the life of the mother which could not be handled in the home. It is primarily the results obtained in these 6,537 cases followed throughout pregnancy, labor and puerperium that are included in this report. Of these cases 4,550, or 70 per cent, were white, and 1,987, or 30 per cent, were colored. There were 1,075, or 16.4 per cent, primiparas and 5,462, or 83.6 per cent, multiparas, a ratio of 1:5. The presentations diagnosed at the time of delivery are shown in Table I and are approximately the same as those cited in most standard textbooks.

TABLE I. PRESENTATIONS

	NUMBER	PERCENTAGE
Cephalic	6,327	96.7
Breech	181	2.8
Face	18	0.3
Transverse	11	0.2
Total	6,537	100.0

Regarding the method of termination, 6,278, or 96 per cent, delivered spontaneously, and 259, or 4 per cent, were completed by some operative procedure from below. This figure is not absolutely accurate inasmuch as many of the 326 patients hospitalized were delivered by some operative measure which obviously would elevate the incidence of operative deliveries.

TABLE II. TYPES OF OPERATIONS

OPERATION	NUMBER	PERCENTAGE OF OPERATIONS	PERCENTAGE OF TOTAL DELIVERIES
Forceps	191	74	3.0
Versions	26	10	0.4
Breech extractions (including forceps to after-coming heads)	30	12	0.4
Craniotomies	12	4	0.2
Total	259	100	4.0

Table II reveals a heavy preponderance of forceps operations, as one might anticipate, and a seemingly high incidence of craniotomies, which will be explained later.

Table III gives an analysis of the forceps extractions.

It will be noted that one mother died (Table III) after a midforceps operation, an incidence of 0.5 per cent. This patient died from an ether pneumonia. We now use parasacral anesthesia in most of our operative deliveries. There were ten fetal deaths, an incidence of 5.2 per cent; these deaths included stillbirths and babies dying within the first two weeks of life. It is important to mention

here that no interference is made in any case, even for teaching purposes, unless a definite valid indication exists. The indications for the use of forceps are tabulated in Table IV.

TABLE III. ANALYSIS OF FORCEPS OPERATIONS

TYPES	NUMBER	PERCENTAGE OF FORCEPS	MATERNAL MORTALITY	FETAL MORTALITY
High	6	3.2	0	0
Midplane	102	53.3	1	8
Low	83	43.5	0	2
Total	191	100.0	1	10

TABLE IV. INDICATIONS FOR FORCEPS

MATERNAL CAUSES	NUMBER	PER CENT	FETAL CAUSES	NUMBER	PER CENT
Uterine inertia	36	18.8	Persistent occiput posterior	74	38.5
Contracted pelvis	26	14.0			
Cardiac	7	3.6			
Abruptio placentae	1	0.5	Deep transverse arrest	37	19.5
Late toxemia	7	3.6	Prolapsed cord	3	1.5

There were 26 versions performed in this series, 25 in multiparas and one in a primipara for prolapsed cord (Table V). Versions are done in primiparas only when absolutely necessary. If the head remains high after an adequate test of labor in a primipara, we prefer to do a cesarean section, conditions permitting, and if the head is engaged in the pelvis a forceps extraction is, as a rule, the safer procedure.

TABLE V. INDICATIONS FOR VERSION

INDICATION	NUMBER	PERCENTAGE
Transverse presentation	11	42.0
Persistent high occiput posterior	2	8.0
Prolapsed cord	6	23.0
Asynclitism	2	8.0
Face presentation	5	19.0
Total	26	100.0

No mothers were lost in this series of versions, but nine babies succumbed, either during or soon after delivery, giving a mortality of 34.6 per cent. This figure is slightly higher than that obtained in smoothly functioning, well equipped maternities, but all of these versions were done in extremely poor homes under enormous handicaps.

All of the twelve craniotomies were done on dead babies, as it is deemed inadvisable to subject a mother to the risk of a difficult version or forceps operation when the fetus is already dead. There were no maternal fatalities in this group.

There were twenty-one cases of complete prolapse of the cord, or 0.3 per cent of the total number of cases. The method of procedure and the results obtained are shown in Table VI.

No mothers were lost, but six babies died, a fetal mortality rate of 29 per cent, approximately the same as cited in the larger maternities, and less than in most general hospitals. The method used in handling this complication, because of the ill chosen operating room, is somewhat different from that usually employed. As soon as the interne notes the cord lying in the vagina, he immediately cautions

the patient to restrain from any bearing down efforts, and she is placed in either a knee-chest or a Trendelenberg position to await the arrival of the resident and his assistants. Of course, a few babies are going to perish in the interim, but this is unfortunately unavoidable. In some instances where the patient's home is not too far from the Center, and she is almost completely dilated, the interne is instructed to wash off the vulva carefully, insert a sterile gloved hand into the vagina and hold the presenting part up to relieve any possible pressure on the cord. On arrival of the resident an operating room is quickly improvised and

TABLE VI. PROLAPSED CORD

OPERATION	NUMBER	PERCENTAGE	MATERNAL MORTALITY	FETAL MORTALITY
Version and extraction	9	43.0	0	2
Forceps	3	14.0	0	1
Craniotomy	1	5.0	0	1
Spontaneous delivery	8	38.0	0	2
Total	21	100.0	0	6

the baby is delivered by an operation which will give it the least risk without jeopardizing the life of the mother. When the cord prolapses before the cervix is completely dilated or dilatable, we are in somewhat of a dilemma. In a good hospital under these circumstances one can thoroughly cleanse off the cord, replace it and insert a bag, with but slight danger of infection, but in the type of home in which we operate, this procedure would be extremely hazardous to the mother. The procedure is either a Braxton-Hicks version, if conditions permit, or otherwise to leave the case alone, hoping that the pressure will be insufficient to cause death of the fetus before the patient is completely dilated and delivery is safe.

Postpartum Hemorrhage.—A loss of 500 c.c. of blood during or immediately following the third stage of labor is classified as a postpartum hemorrhage. Because we are dealing with a transient group of young doctors, we necessarily have to overemphasize the seriousness of blood loss, with the natural consequence that our doctors will overestimate rather than underestimate the amount of blood lost. We take great pains to encourage this attitude, as it seems preferable to have the doctors become alarmed too early rather than too late. This fear or respect for blood loss inculcated in our doctors' minds probably accounts for the large number of postpartum hemorrhages in this series of cases. There were 243 cases where the interne estimated a blood loss of 500 c.c. or over, or an incidence of 3.7 per cent. Table VII shows the method of delivery in these cases, as well as the type of treatment employed.

TABLE VII. POSTPARTUM HEMORRHAGE

DELIVERY	NUMBER	PERCENTAGE	TREATMENT	NUMBER	PERCENTAGE
Spontaneous	190	78.0	Medicinal	191	78.6
Precipitate	14	5.7	Manual removal of placenta	16	6.6
Operative	39	16.3	Uterine pack	36	14.8
Total	243	100.0	Total	243	100.0

As will be noted in Table VII, medicinal or mechanical measures sufficed in 191, or 78.6 per cent, of these cases. This consisted of hypodermic injections of pituitrin, aseptic ergot or gynergin, assisted by fundal massage with expulsion of the blood clots. It was also found efficacious in certain cases to insert a hand in the lower uterine segment while the external hand sharply anteflexed

the body of the uterus over the symphysis, thus compressing the uterine arteries. Where supportive treatment was indicated, normal saline solution was given under the skin, hypertonic glucose solution in the vein, and blood transfusion was done, if it was considered necessary. In sixteen cases it was found necessary to re-enter the uterus under the strictest of aseptic precautions and remove the placenta manually, and in thirty-six cases it was also found necessary to pack the uterus and vagina tightly with ten to twelve yards of plain sterile gauze. Thirteen of these latter patients were hospitalized soon afterward for treatment of secondary anemia. It may be of interest to mention that since this report was compiled we have instituted a blood transfusion unit for emergency transfusions in the home. The citrate method is used, typing and cross-matching the husband, relatives, or friends, trying to eliminate anyone with the least suggestion of a history of syphilis. This procedure, of course, is only used in desperate cases. Two mothers died in this series, giving a mortality of 0.8 per cent. These cases will be discussed with the other maternal deaths. It may also prove interesting to know that in addition to the sixteen manual removals of the placenta for hemorrhage, there were forty-two additional cases in which the placenta was removed manually because of failure to separate after several hours in the third stage with no bleeding. There were no fatalities or severe infections in any of these forty-two cases, again demonstrating the value of good asepsis.

Dührssen's Incisions.—This splitting of the effaced cervix at ten, two, and sometimes six o'clock was done as a preparatory operation twenty-five times. This is an incidence of 9 per cent of the operative cases and 0.3 per cent of the total number. All 25 patients were primiparas in whom the cervix was completely effaced, the paracervical tissues well retracted, and dilatation at 7 cm. or more. The average length of the first stage was forty-four hours, and the only indication was either severe maternal exhaustion or fetal distress. There was midforceps extraction in 21 cases, low forceps in 2, breech extraction in one and craniotomy in one. No mothers died and the fetal mortality was two. All incisions were immediately repaired with interrupted chromic catgut sutures where the patient was afebrile. Six weeks later, on postpartum examination, it was found that 20, or 80 per cent, of the incisions healed by primary intention, and 5, or 20 per cent, healed only fairly well with a slight eversion and gaping which responded well to the actual cautery treatment.

Episiotomy and Laceration.—Episiotomy was performed in 223, or 3.3 per cent, of all cases. This was not carried out as a routine but only in those primiparas in whom a laceration seemed imminent and in those multiparas who had had a previous episiotomy or a vaginal plastic with an abundance of scar tissue. It was done routinely on all primiparas in whom the delivery was completed by operative measures or when the fetal heart tones became irregular with the head on the perineum. There were 191 perineal lacerations, or an incidence of 2.7 per cent; 190 of these were second degree tears and one was a third degree. All episiotomies and lacerations were immediately repaired with interrupted chromic catgut in the mucosa and figure-of-eight silkworm sutures through the muscle, fascia, and skin in the perineum. The results obtained were considered satisfactory.

Breech Presentation.—There were 181 cases of breech presentation, 31 occurring in the primiparas and 150 in multiparas. The deliveries were completed as shown in Table VIII.

It was found from experience that in home deliveries particularly it is far more preferable, from both the standpoint of the mother and child, to allow the patient, whenever it is humanely possible, to expel all or at least a greater part of the baby spontaneously. By this method there is less likelihood of complica-

tions resulting from an inadequately dilated cervix or from an extension of the arms above or behind the head.

In this series there were fourteen fetal deaths for an incidence of 7.7 per cent and this is considered a favorable result in an out-patient clinic. There were no maternal deaths.

TABLE VIII. BREECH PRESENTATIONS

DELIVERY	NUMBER	PER-CENTAGE	MATERNAL MORTAL-ITY	FETAL MORTAL-ITY
Spontaneous	80	44.2	0	3
Manual aid	71	39.2	0	5
Forceps to after-coming head	24	13.2	0	4
Extraction	6	3.4	0	2
Total	181	100.0	0	14 or 7.7%

Cesarean Section.—Although none of the cesarean sections were performed in the home, the figures are included in this report in order to demonstrate the number of sections necessary and the results which can be obtained in a general obstetric practice. The number of cases requiring sections should approximate that in a group of general practitioners with the same size practice as ours, and not the number done in the average hospital for obvious reasons. Also, we cannot compare our series with the obstetric specialist's, inasmuch as he will be more apt to receive patients who have had a previous section or will often be called in consultation by the family doctor in cases needing this type of delivery.

Cesarean section was selected as the operation of choice in 45 cases, or in one in each 152 deliveries, an incidence of 0.65 per cent. Laparotrachelotomy was performed in 31, or 68.9 per cent, of these cases. One classic section was performed on a badly exsanguinated patient with a placenta previa centralis, and the remaining 13 were Porro sections. One was done on a case of uteroplacental apoplexy in which the entire uterine musculature was infiltrated with blood, the type described by Couvelaire; several were done on multiparas near the menopause where sterilization was indicated and/or desired, and all cases were either potentially or actively infected, and it was concluded that the risk involved was not worth the price of the uterus. The results obtained were interesting. In spite of the emergency character of these cases, not one mother's life was lost, but 9 babies died, a fetal mortality rate of 20 per cent. The cause of death could be explained in 7 of these 9 patients; 2 occurred in patients with severe nephritic toxemia, both babies being mature but small and dying within a few days. Four babies' deaths were due to a complete abruptio placentae, including the one of uteroplacental apoplexy previously mentioned. One baby died from syphilis in a primipara with a recognized and treated syphilis; she was sectioned for a placenta previa centralis with severe hemorrhage. The cause of the other two deaths could not be ascertained.

Ruptured Uterus.—Rupture of the uterus occurred in three cases, or 0.04 per cent, two being unquestionably definite complete ruptures and the third a doubtful incomplete tear, the type of case frequently overlooked unless the uterus is extirpated and the lower uterine segment examined minutely. One case occurred during version and extraction in a multipara for a prolapsed cord. The patient was sent to a hospital where a blood transfusion and supravaginal hysterectomy was done immediately with recovery. The second case occurred either before or during craniotomy. In all difficult operative procedures it is our custom, immediately following the removal of the placenta, to change our gloves and under strict aseptic precautions carefully invade the uterine cavity and explore for

possible tears. Therefore, in this case the rupture was instantly recognized and the patient rushed to the hospital where blood transfusion and supravaginal hysterectomy were done with recovery. The last case was a spontaneous delivery followed by a severe postpartum hemorrhage which was controlled by pituitrin, gynergen, and uterine packing. The diagnosis of an incomplete rupture was considered questionable because the uterus was obtained after the patient's death, and it had been perforated by an undertaker's trocar. All three babies in these cases died. An instructive point brought out here is that the two cases in which a complete rupture was diagnosed on uterine exploration, both recovered after blood transfusions and supravaginal hysterectomy, but the case in which a laparotomy was not done died, which, of course, testifies to the value of an early diagnosis immediately followed by hysterectomy coincidental with blood transfusion in this obstetric accident.

Fetal Mortality.—The fetal mortality was computed on all babies weighing 1,500 gm. or over, stillborn or dying during the first two weeks of life. In our home service 186 babies died, an uncorrected gross fetal mortality of 2.84 per cent. Of this number 149, or 79 per cent, were mature infants and 37, or 21 per cent, were premature but viable. The corrected fetal mortality was 104 deaths or 1.60 per cent. Unfortunately only 40 per cent of these deaths came to autopsy, and, therefore, it is impossible to determine accurately the cause of death in all cases. The approximate causes of fetal death were asphyxia neonatorum, cerebral hemorrhage, prolapsed cord, fetal atelectasis, prematurity, melena, pneumonia, syphilis, abruptio placentae, drug addiction, and suffocation.

The method of delivery employed in these 104 cases is shown in Table IX.

TABLE IX. METHODS OF DELIVERY IN CASES WHERE BABY DIED

DELIVERY	NUMBER	PERCENTAGE
Forceps extraction	10	9.6
Version and extraction	9	8.6
Breech presentation	12	11.6
Breech extraction	2	1.9
Craniotomy	12	11.6
Spontaneous	59	56.7
Total	104	100.0

Maternal Mortality.—The reason for not including a study of our morbidity in this series is because our statistics in this regard are valueless. The patients are all confined at home and are usually visited once a day by either an interne, student, or nurse. The temperature readings are recorded only once a day and that at different times. In cases of frank sepsis, of course, the patient is seen more often.

Our maternal mortality is computed not only on those patients who died in the home, but also on all patients seen by us and then hospitalized, who died immediately or within several weeks after delivery. In this way only can any outpatient obstetric clinic report its statistics and analyze the outcome of all the cases, both pathologic as well as normal.

We had twelve maternal deaths, or one in 586 live births, an incidence of 0.17 per cent. Of these fatal cases 3, or 25 per cent, died in their own home and 9, or 75 per cent, died in a hospital. A very brief summary of each of these case histories follows.

CASE 1.—Mrs. D. L., colored, twenty-eight years of age, gravida iv; three full-term normal deliveries. Labor lasted four hours and was spontaneous. The third stage lasted fifteen minutes, and the placenta was delivered by simple expression, immediately followed by severe postpartum hemorrhage, estimated blood loss

being 1,500 c.c. The patient went into shock; 300 c.c. of a 20 per cent glucose solution was given in the vein and adrenalin and caffeine administered. The diagnosis made at this time was atony of the uterus. The patient lived nine hours. The uterine cavity was thoroughly explored and no tear found. Autopsy was performed after an undertaker had perforated the uterus with a trocar. Diagnosis at autopsy: Incomplete rupture of the uterus.

CASE 2.—Mrs. M. S., white, aged twenty-two years, gravida iii. Two previous spontaneous full-term deliveries. Prenatal care was inadequate. Had headaches for two days without notifying Center. Our doctor was called on Dec. 22, 1933, and found her blood pressure 130/70 and 4+ albumin in her urine. The patient was irritable and had a transient hemiplegia of the left side of the face; fetal heart tones regular; dilatation 4 cm., station +1. Delivered spontaneously. She was given ¼ gr. of morphine sulphate and 1.5 gr. of luminal immediately following delivery. Her blood pressure was 108/60, pulse of 90. The paralysis had cleared up and she vomited once. Four hours later her husband reported that the patient was having convulsions. We arrived on the case thirty minutes later and found the patient dead in bed. Autopsy was refused. Clinical diagnosis: Acute eclampsia. The baby lived.

CASE 3.—Mrs. M. C., white, thirty-five years old, gravida iv; had two spontaneous deliveries and one induced abortion. Labor lasted eight hours and was normal throughout. Placenta and membranes were retained and severe postpartum bleeding ensued. Treatment: Manual removal of the placenta; uterine packing; 20 per cent glucose solution in the vein; normal saline solution was administered under the skin, pituitrin, and gynergen were given. The patient died two and a half hours later from primary hemorrhage. Autopsy was refused. Diagnosis: Postpartum hemorrhage due to retained placenta. The baby lived.

CASE 4.—Mrs. A. D., colored, nineteen years old, gravida i. She precipitated at term. No rectal or vaginal examinations were done. At the time of her delivery she had an upper respiratory infection; her temperature was 99° F. and pulse 92. On the following morning her temperature rose to 103°, pulse 120, and she complained of pain in the left lower quadrant. She had a moderate chill at 5 P.M. and at 6 P.M. her temperature went to 97° and her pulse was 80 but of poor quality. She was sent to a hospital where she died on her ninth postpartum day. Autopsy was performed and demonstrated a ruptured pus tube on the left side with a generalized peritonitis. The baby lived.

CASE 5.—Mrs. M. Y., colored, twenty-five years old, gravida ii; had one spontaneous abortion at the fifth month. Physical examination was negative except for generally contracted pelvis; Wassermann negative. The first day of the last period was on May 5, 1932; in December, 1932, she had had an upper respiratory infection with complete recovery. She went into labor on Feb. 6, 1933, the second stage lasting four hours because of a persistent occiput posterior. She was delivered by manual rotation, midforceps, episiotomy, and manual removal of the placenta for postpartum bleeding. During delivery ether anesthesia was administered for thirty-five minutes. At the time of delivery her temperature was 99.2°, pulse 80, and blood pressure 125/80. On Feb. 13, 1933, sutures were removed and her perineum appeared normal. On February 15 she had a chill and a swelling was noted on the left labia majora. At this time her temperature was 102° F. and pulse 100. The episiotomy incision was reopened under ether narcosis because of the patient's refusal to cooperate. She was sent to a hospital on February 17 under the care of a private physician, and died the following day. Autopsy findings were an infected perineum, Bartholin abscess and a bronchopneumonia probably due to the ether anesthetic. The baby lived.

CASE 6.—Miss L. P., white, aged nineteen years, gravida i, a prostitute. We were called on the case by a private physician after he had made a vaginal examination. Labor lasted nine hours and delivery was spontaneous without an episiotomy. Blood loss was estimated at 350 c.c. The fifth postpartum day her temperature rose to 101.4°, pulse 88, and she continued a septic course for fourteen days. The fundus at this time was two fingerbreadths above the symphysis; lochia foul but scant; abdomen moderately tender. At this time, contrary to orders, the patient got out of bed and took a vaginal douche. The patient when next seen appeared quite ill, and examination showed the chest normal, moderate distention of the abdomen with extreme tenderness, which was more marked in the pelvis. Diagnosis was made of bilateral salpingitis. The patient was sent to a hospital where she died three weeks later. At autopsy a gonorrheal peritonitis was found. The baby lived.

CASE 7.—Mrs. M. B., white, twenty-six years of age, gravida iii, had two spontaneous deliveries. Present labor lasted twelve hours and was normal, with no lacerations. Third stage was normal with a blood loss of about 100 c.c. Three days following delivery, her temperature rose to 102° and pulse to 100, and there were pain and tenderness in the lower abdomen but no rigidity. Lochia was moderate in amount and foul. The following day her temperature was 104° and pulse 140; examination revealed anxious facies, profuse sweating, herpes on side of nose; tongue moist, throat inflamed, chest negative, abdomen distended and exquisitely tender. The uterus was palpated 6 cm. above the symphysis and was very tender. Urinalysis was negative for pus cells. Diagnosis was made of generalized peritonitis. The patient was sent to a hospital. Three days later she developed an ileus for which an enterostomy was performed. Blood culture revealed a hemolytic streptococcus, and the patient died the following day. Autopsy findings confirmed the diagnosis of septicemia and generalized peritonitis. The baby lived.

CASE 8.—Mrs. M. F., colored, twenty-four years old, gravida iii, had two previous spontaneous deliveries. The date of her last period was unknown and her prenatal care had been inadequate. On Nov. 6, 1933, at her last visit to the clinic, her blood pressure was 118/76 and urine negative. She called the Center on December 26, but before our arrival had gone to a hospital. The husband stated that she had had four convulsions at home. Delivered spontaneously next day of a stillborn fetus and died two hours later. Diagnosis: Eclampsia.

CASE 9.—Mrs. H. K., colored, thirty years old, gravida iv. Had one full-term, one premature delivery, and one spontaneous abortion. The first day of her last menstrual period was April 16, 1933. She delivered spontaneously on Jan. 7, 1934, after a sixteen-hour labor; blood loss was estimated at 100 c.c.; no lacerations. Before our arrival an internal examination had been done by an elderly midwife. Immediately following delivery the patient's temperature was 99.2° F., pulse 90. On January 10, she was quite ill and restless; temperature 105.4° and pulse 140. The uterus was firm, three fingerbreadths below the umbilicus; there was marked abdominal tenderness and foul lochia. The interne was surprised to see that her entire genitalia was completely covered with a thick paste of molasses and sugar which the patient said had been applied by the midwife. This was cleaned off and the usual treatment for sepsis instituted. On January 11 her temperature was 100° and pulse 88, but the following day she again appeared very ill and was sent to the hospital where she died sixteen days later. Autopsy diagnosis: Puerperal sepsis. The baby lived.

CASE 10.—Mrs. H. J., colored, twenty-nine years old, gravida iii, had two previous normal deliveries. The first day of her last period was Aug. 16, 1933. At the prenatal clinic on Jan. 16, 1934, her blood pressure was 170/120, urine negative,

Wassermann negative. On March 6 her blood pressure was 170/110, urine negative, but she complained of some edema of the hands and feet and also headache. She was told to return in one week but this she failed to do. She died suddenly during the night of April 2, most likely during her sleep as she gave no warning of this impending tragedy. It was a coroner's case and no autopsy was performed; the clinical diagnosis was eclampsia.

CASE 11.—Mrs. S. G., white, aged thirty-three years, gravida v. She had had four previous spontaneous deliveries. The first day of her last menstrual period was Sept. 18, 1932. General physical examination was negative. On June 24, 1933, she had an easy spontaneous labor lasting fifteen hours. On July 5 she was discharged in good condition, but on July 17 she complained of headache, nausea, vomiting, and pain in the chest. The abdomen, pelvis and lower extremities were normal, but there were fine râles in the chest. On July 18, 1933, her headache became more severe and she complained of severe pain in the epigastrium. On July 20 her temperature was 101.2° F., pulse 84. Examination showed the throat to be injected, râles throughout the chest, the abdomen negative except for tenderness over the gallbladder region, pelvis negative. She was sent to a hospital on July 21 and was discharged to her home on July 27. On the twenty-ninth of July her temperature was 102.6° F., pulse 84, and she appeared semicomatose. Because of the physical findings a tentative diagnosis of tubercular meningitis was made. She was again sent to the hospital on August 1, where she died on the tenth. An autopsy was performed and the diagnosis of tubercular meningitis confirmed.

CASE 12.—Mrs. J. O., white, aged thirty-eight years, gravida vii, had two spontaneous abortions; one premature stillbirth at the seventh month and three full-term spontaneous deliveries. Wassermann 4+, for which she received intensive antisyphilitic treatment. She last menstruated in November, 1933, and was delivered spontaneously of a three-pound stillborn premature infant on May 8, 1934. At the time of delivery her temperature was 100.2° F. and pulse 106. Later in the afternoon her temperature was 101° and pulse 120; blood pressure normal; râles were heard in the right lung. On May 9 her temperature was 102.2° F. and pulse 134. On May 12 temperature was 101.6° F., pulse 114, and respirations 30. She was seen by a consultant who made a diagnosis of cavity formation and fluid in the right chest. The patient was sent to a hospital where she died on May 20, 1934. Autopsy diagnosis: Pulmonary tuberculosis.

An analysis of these 12 fatalities reveals that there were 2 primiparas and 10 multiparas; 6 white and 6 colored. One patient died from rupture of the uterus, 1 from postpartum hemorrhage, 1 from ether pneumonia, 2 from some form of tuberculosis (meningeal and pulmonary), 3 from eclampsia, and 4 from sepsis. Relative to the fetal outcome in these cases where the mothers died, 8 babies were born alive and discharged in good condition; 2 were stillborn (due to syphilis in one and toxemia in the other); 1 baby perished unborn in an eclamptic mother's uterus, and 1 died fifteen days after birth from some blood dyscrasia.

SUMMARY

1. This report covers a series of 6,863 cases, of which 6,537 were delivered in poorly furnished, unsanitary homes during a period of two years.

2. The operative incidence was approximately 4 per cent, on which 74 per cent were forceps deliveries.

3. There were 45 cesarean sections, or one in 152 deliveries, an incidence of 0.65 per cent.

4. One hundred and four babies were lost, a fetal mortality of 1.6 per cent. The fetal mortality for forceps was 5.2 per cent; versions, 34.6 per cent; prolapsed cord, 29 per cent; rupture of the uterus, 100 per cent; breech presentation, 7.7 per cent; and cesarean section, 20 per cent.

5. Twelve mothers died, 3 in their own homes, a maternal mortality of 0.17 per cent.

CONCLUSIONS

Conservative, patient management of obstetric cases, especially when delivered in the home, is undoubtedly the prime factor in keeping down an already unnecessarily high fetal and maternal mortality.

While it is certainly desirable to get a live healthy child, we feel that one is never justified in doing this at any moderate risk to the mother.

The value of these statistics is an attempt to establish a possible standard for comparison in the evaluation of results obtained by the average general practitioner and the occasional obstetrician with a similar type of practice, although we realized that comparisons in obstetrics are odious and not accurate, due to differences in economic, racial and geographic conditions.

Good obstetrics can be done under seemingly unsurmountable obstacles with proper supervision.

We feel that universities should take more advantage of this form of obstetric education since the student can get a better insight into the intricacies of abdominal and rectal diagnosis, the mechanism of labor, and the rigid aseptic technic as it must of necessity be practiced in the home.

55 East Washington Street

Crossen, Robert J.: A New Electrode for Conization of the Cervix, J. Missouri M. A. **32**: 125, 1935.

A new electrode for conization of the cervix with a cutting current is presented. It permits the treatment of more extensive cases of chronic cervicitis than does the Hyams electrode. Its use in 80 cases in the hands of 16 different members of a gynecologic service of Washington University over a period of two years shows it to be safe and effective. It removes the entire junction of the squamous and columnar epithelium where carcinoma is most likely to start, thereby giving a better specimen for diagnosis of early carcinoma. Removal of this chronic infected tissue becomes an important factor in the prevention of cervical carcinoma. It is hoped that by combining conization with an anterior and posterior Sturmdorf suture, the cases with extensive eversion ordinarily requiring a Sturmdorf operation can be done with much greater facility. The cases thus handled are as yet insufficient in number to justify conclusions as to the value of this combined technic. The cutting current eliminates the bleeding which is a troublesome feature of the Sturmdorf operation.

J. Thornwell Witherspoon.

THE OCCURRENCE AND SIGNIFICANCE OF DECIDUAL CHANGES OF THE ENDOMETRIUM IN EXTRAUTERINE PREGNANCY*

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IN THE field of obstetrics and gynecology extrauterine pregnancy is outstanding as a condition involving great uncertainty in diagnosis due to the variability of symptoms and signs. This is the more regrettable since the treatment is so well defined. The pathology likewise is fairly well understood, and our knowledge here has been extended to the associated changes in the uterus, especially since the work of Sampson published in 1914. The presence or not of one of these changes (the decidual reaction of the endometrium) has received some attention as an aid in differential diagnosis. Yet, textbooks show lack of agreement and indefinite information as to what assistance can be expected from the examination of uterine curettings in suspected cases. Williams said, "Formerly, such stress was laid upon the presence of decidual tissue that in doubtful cases curettage was recommended for diagnostic purposes. My own experience has taught me that while the presence of decidua in such circumstances usually affords strong presumptive evidence, its absence is not equally convincing, for in many instances the decidua may have been replaced by normal endometrium by the time the patient is examined." Graves stated that, "Microscopic examination of curettings gives some information, for if chorionic villi are present ectopic pregnancy may be ruled out. Sometimes, however, the fetal remains of a uterine abortion disappear rapidly whereas the decidual reaction may exist for a considerable time." Other authors of textbooks stress the diagnostic importance of the procedure on the one hand or its unreliability on the other, some make little or no mention of it, while still others consider curettage too fraught with danger in ectopic pregnancy to be used for diagnosis.

A review of the more recent literature does not support the belief that curettage is unduly dangerous in extrauterine pregnancy. Indeed, it is not reasonable to expect it to be as likely a cause of rupture as bimanual examination. If this is true, the question, then, concerns itself with the reliability and usefulness of the procedure. Consequently, a study was made of the 24 cases of histologically proved

*Read before the Detroit Obstetrical and Gynecological Society, May 7, 1935.

extrauterine pregnancy, with available endometrium, found among the 124 treated by operation at Harper Hospital from January, 1930, to March 31, 1935. Of these 24 cases, the endometrium was obtained by uterine curettage in 20, by hysterectomy in 2, and by decidual cast and discharged fragments in one each. Further, a statistical study and comparison was made with four other suitable series, namely, those of Sampson, Geist and Matus, Moritz and Douglas, and Börner. Unfortunately, the excellent paper of Novak and Darner lacks sufficiently detailed data for this statistical comparison. Scheffey, Morgan and Stimson and others likewise give little or no information which could be used here.

The invariability of uterine decidual development in association with extrauterine pregnancy has received almost unanimous sanction. When not found, the explanation has been advanced that it had degenerated or been cast off following death of the ovum. There is some evidence to indicate, however, that decidual changes may occur more slowly than in normal pregnancy (Kaufman). Indeed, Liepmann believed that in a few cases decidua did not develop. Furthermore, Moritz and Douglas reported six cases without decidua in which there was no history of bleeding or desquamation from the vaginal tract. Practically, though, it may be assumed that decidual changes occur in the uterus with any pregnancy, whatever its location.

It must be admitted that there is a remote chance of diagnostic error even when decidua is found without chorionic elements. The quotation from Graves given in the first paragraph states that the fetal tissue fragments in uterine abortion may disappear before the decidua. Anything resembling intact decidua must be very rare under such circumstances. Frank reported the expulsion of a decidual cast, intact except for the fundal part, which was followed in twenty-four hours by a small ovum. There were no villi in the cast, and curettage here might have resulted in an incorrect diagnosis. However, it is not clear to me that this was not actually an example of interstitial pregnancy with abortion into the uterine cavity. I have known microscopic sections from a therapeutic abortion to show only decidua, while others made later from the same material contained abundant chorionic villi. Though the possibility of error must be recognized, yet it is apparently so slight that the finding of decidua may be accepted as strong presumptive evidence of ectopic pregnancy (Williams, Novak and Darner, etc.).

In Table I are given the Harper Hospital cases showing the method by which each specimen of endometrium was secured; the number of days from the last normal menstrual period until the specimen was obtained; the number of days between the onset of abnormal vaginal bleeding and the curettage, hysterectomy, etc.; and the type or phase

of endometrium found. Since abnormal vaginal bleeding is considered to be a reliable sign of beginning ovular death, which results in subsequent desquamation of the decidua, the cases were tabulated according to the time elapsing between the onset of this bleeding and securing of the specimen. Pain is considered by some to have equal significance with bleeding in regard to the beginning death of the ovum. In this series the two were usually coincident, though in a few cases pain preceded by a few days. In four instances pain definitely followed bleeding: Case 14, thirteen days; Case 19, twenty-seven days; Case 20, ten days; and Case 24, twelve weeks. A rearrangement of the table, however, with pain as the criterion, would make no essential difference in the occurrence of decidua in relation to beginning ovular death.

Table I shows that decidua was present in 16 of the 24 cases. In 5 instances, where bleeding had lasted a week or less, decidua was found in all. When it had lasted between one and two weeks, decidua was present in 4 out of 5 cases. In the remaining 14, with the onset of bleeding more than two weeks before the endometrium was obtained, a decidual reaction was found in seven. In one of these (Case 18) the compact layer had been largely lost. The remaining spongy layer was typical of pregnancy, but such a finding would naturally

TABLE I. HARPER HOSPITAL CASES OF EXTRAUTERINE PREGNANCY, SHOWING DURATION OF VAGINAL BLEEDING AND TYPE OF ENDOMETRIUM

	H. H. CASE NUMBER	SPECIMEN OBTAINED BY—	L.M.P.— DAYS BEFORE SPECIMEN OBTAINED	ONSET OF HEMORRHAGE— DAYS BEFORE SPECIMEN OBTAINED	ENDOMETRIUM TYPE
1.	73918	Curettage	49	1	Decidua
2.	84937	Curettage	50	4	Decidua
3.	96097	Curettage	54	4	Decidua
4.	57104	Pieces expelled	66	5	Decidua
5.	59430	Curettage	48	5	Decidua
6.	114405	Curettage	67	10	Decidua
7.	112973	Decidual cast	64	11	Decidua
8.	93097	Curettage	45	13	Decidua
9.	90394	Curettage	52	14	Decidua
10.	103507	Curettage	20	14	Proliferative
11.	87922	Curettage	?	18	Decidua
12.	103241	Curettage	77?	18	Proliferative
13.	63806	Hysterectomy	65	23	Decidua
14.	43171	Curettage	25?	25	Early decidua
15.	113463	Curettage	62	27	Proliferative
16.	111788	Curettage	51	30	Early secretory
17.	57022	Curettage	90 + or −	30	Early secretory
18.	88276	Curettage	76	32	Decidua glands
19.	41519	Hysterectomy	75	34	Decidua
20.	113045	Curettage	79	34	Proliferative
21.	80620	Curettage	56?	56	Decidua
22.	47228	Curettage	117?	63?	Middle secretory
23.	97039	Curettage	94 + or −	65 + or −	Decidua
24.	113305	Curettage	146 + or −	85 + or −	Proliferative

be of questionable value in differentiating intrauterine from extrauterine pregnancy since all parts of a possible uterine pregnancy might also have been cast off with the compacta. In the other instances showing decidua the compact layer was intact, though frequently there were signs of cellular degeneration.

Our series has a definitely higher incidence of decidua than have the four others which were cited above. These reports are abstracted below and in Table II for comparison. It is noteworthy that Moritz and Douglas show a marked discrepancy for cases with absent or recently begun bleeding. Also, Geist and Matus are the only authors to show agreement with the Harper Hospital series in a rather high incidence of decidua with protracted hemorrhage.

TABLE II. FIVE SERIES OF EXTRAUTERINE PREGNANCIES SHOWING INCIDENCE OF DECIDUA ACCORDING TO ONSET OF BLEEDING BEFORE ENDOMETRIUM WAS OBTAINED

ONSET OF ABNORMAL BLEEDING BEFORE SPECIMEN SECURED	SERIES	CASES	DECIDUA	PERCENTAGE
None to one week	Sampson	2	2	100.0
	Geist and Matus	11	10	90.9
	Moritz and Douglas	12	2	16.7
	Börner*	11	10	90.9
	Harper Hospital	5	5	100.0
	Total	41	29	70.7
Eight days to two weeks	Sampson	3	1	33.3
	Geist and Matus	12	7	58.3
	Moritz and Douglas	11	2	18.2
	Börner*	4	1	25.0
	Harper Hospital	5	4	80.0
	Total	35	15	42.9
Fifteen days to three weeks	Sampson	1	0	0.0
	Geist and Matus	6	2	33.3
	Moritz and Douglas	6	1	16.7
	Börner	7	2	28.6
	Harper Hospital	2	1	50.0
	Total	22	6	27.3
Twenty-two days to four weeks	Sampson	8	2	25.0
	Geist and Matus	4	2	50.0
	Moritz and Douglas	12	1	8.3
	Börner*	4	1	25.0
	Harper Hospital	3	2	66.7
	Total	31	8	25.8
Twenty-nine days to twelve weeks	Sampson	11	0	0.0
	Geist and Matus	6	2	33.3
	Moritz and Douglas	12	2	16.7
	Börner*	4	0	0.0
	Harper Hospital	9	4	44.4
	Total	42	8	19.0
	All Cases	171	66	38.6

*Corrected according to author's case histories.

Sampson's article is based on the examination of 25 uteri removed at the time of operation for ectopic pregnancy. The two cases with bleeding of less than a week showed decidua, but where bleeding had lasted from one to two weeks, he saw decidua in only one out of three. He also found decidua twice where bleeding had lasted twenty-five days and four weeks, respectively, but in the remaining 18 cases, with bleeding of three weeks to seventy-two days, decidual changes were not present. In four instances he stated that neither fetus nor villi was found. These might justifiably be eliminated from calculation as unproved ectopic pregnancies, as was done in three of the Harper Hospital cases.

Geist and Matus reported 39 cases in which the endometrium was obtained by curettage in 23; by hysterectomy, abdominal hysterotomy, and autopsy in 8; and from decidual casts in the remainder. They found decidua in 10 of 11 with bleeding up to one week (three had none), in 7 of 12 with bleeding for more than one week and up to two weeks, and in 6 out of the 16 with more prolonged bleeding. The not unusual persistence of decidua after prolonged hemorrhage suggested that bleeding was not the only controlling factor in the expulsion of casts. The same was thought in regard to fetal death. They stated that a viable fetus was sometimes found after fourteen to forty-eight days of bleeding. Furthermore, the higher incidence of decidua with slight bleeding led them to believe that "spotting" was of less importance than frank hemorrhage as indication of ovular damage.

Moritz and Douglas reported 53 cases of ectopic pregnancy with decidua in eight. Among 12 cases with recent or no bleeding only 2 showed decidua, and throughout there was found little or no relationship between type of endometrium and length of the bleeding period. In fact, they reported decidua in two instances after eight weeks of bleeding but also six cases without decidual reaction and without history of hemorrhage.

Börner examined the endometrium obtained by curettage in 30 cases, finding decidua in fourteen. After a slight correction of his figures to correspond to definite statements regarding bleeding in his case protocols, there are found to be 11 with bleeding one week or less before curettage, of which 10 showed decidua. In the four with bleeding from eight days to two weeks there was one with decidua. With bleeding beginning earlier (up to fifty days) decidua was present in only three out of fifteen. Börner further attempted to correlate the cyclic stages of the endometriums (without decidual changes) with the duration of the bleeding.

Table II shows the incidence of decidua in all five series, the cases being grouped according to the onset of abnormal bleeding before obtaining the endometrium specimens. Apparently, when bleeding has lasted one week or less (and this is true as an average even with the low incidence reported by Moritz and Douglas), there is an excellent chance of finding decidua at diagnostic curettage. The figures given by Moritz and Douglas could be considered as confirming the warning that the absence of decidua, even in early bleeding, is not reliable negative evidence. After the first week of bleeding, the presence of decidua in the uterus is much less frequent. Yet, when found, there is no obvious reason to question its significance.

There is no ready explanation for the almost uniformly higher percentage of decidua findings in the Harper Hospital series. It should be mentioned that specimens were traced through the laboratory files

and were all diagnosed before the clinical records were consulted, so that these had no influence on the examiner. Nor is there any reason to question the reliability of the majority of the histories as the women were, with one exception, private patients and therefore in general sufficiently intelligent and informed to give accurate accounts of their symptoms. The few indefinite or questionable records are indicated in Table I by plus and minus signs or question marks.

It is obvious that this series contains too few cases for definite conclusions, but the clinical information obtained in the 20 patients subjected to curettage was so striking as to suggest, at least, that the diagnostic value of the procedure has been understated. The histories of these 20 patients showed that the majority presented obscure signs and symptoms; yet in 12 there was decidua without chorionic elements, a finding carrying a high degree of diagnostic probability. And, in the remainder, the absence of fetal elements in the uterus could have helped to rule out the possibility of uterine abortion. There was no evidence in any case of harmful effect from the procedure. It was impracticable to trace, for comparison, instances of suspected extrauterine pregnancy in which curettage was done but in which some other condition was finally found.

SUMMARY

The development of decidual changes of the endometrium in association with extrauterine pregnancy is generally acknowledged. Textbooks, however, give equivocal information regarding the performance of diagnostic curettage in obscure cases, though it is conceded that definite presumptive evidence of extrauterine pregnancy is given by the presence of decidua alone, and without chorionic elements. This was the finding in sixteen out of twenty-four cases of ectopic pregnancy from Harper Hospital.

Decidua disappears some time subsequent to beginning ovular death, as manifested by vaginal bleeding and pain. Our series, however, and four others from the literature showed such a high incidence of decidua when abnormal bleeding had preceded by only a week, or less, that diagnostic curettage seems indicated for indefinite cases with hemorrhage of short duration. After more prolonged hemorrhage, decidua was reported infrequently in three of the series cited from the literature but was rather frequent in the fourth. It was seen in about one-half of our cases with protracted bleeding, and was actually or potentially of considerable value in differential diagnosis.

I wish to take this opportunity to express my thanks to Dr. P. F. Morse for permission to use the pathologic material from the Laboratory of Harper Hospital.

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A STUDY OF 4,000 PATIENTS ADMITTED FOR CONTRACEPTIVE ADVICE AND TREATMENT

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IN A period of approximately six years, from March, 1928, until January, 1934, 4,000 patients have been admitted to the Maternal Health Clinic of Cleveland for advice as to family regulation. The routine of the organization has been such as to afford peculiar opportunity for studying each case in detail. The number of patients available and the duration of their clinic contact have been conducive to accumulating a volume of organized information affording significant observations and deductions.

In the group of 4,000 cases under discussion, 2,869 have been admitted for health reasons. Great variety of disease is to be found recorded among these patients. Patients admitted for health reasons differ qualitatively as well as quantitatively. Apart from those instances in which the health reason resides in the husband or existing progeny, definite grouping has been possible into those women exhibiting organic or functional disease, those having experienced morbidity which may return with ill-timed pregnancy, or those being now in a condition which conservative medical opinion regards as inopportune for the increased burden of pregnancy. For all practical purposes, that group accepted for organic disease indication may be considered as exhibiting permanent, structural change. For these women a contraceptive program has been prescribed to constitute a recognized part of the therapy. Foremost in this group have been patients with tuberculosis, heart disease, or kidney disease.

Many conservative workers have widened their conception of the variety of so-called functional diseases that may constitute an authentic basis for contraceptive advice and treatment in effecting improvement or cure of the patient. Malnutrition, marked asthenia, and neuroses of various types have been recorded as the most frequently recurring examples of health reasons of this sort.

Among those who have experienced morbidity such as to indicate contraceptive advice as part of the prophylactic treatment, have been considered those whose morbidity was closely allied with their pre-

vious pregnancies. Here are listed such conditions as psychoses related to the pregnant state, pyelitis, hyperemesis gravidarum, toxemia of pregnancy, difficult or complicated delivery and frequent, spontaneous miscarriage.

Nursing mothers and women who have recently terminated a pregnancy, either by delivery or miscarriage, have been enrolled in a class where the health hazard consists in unwise overburdening of the patient.

In every other field of medicine, social and economic factors merit recognition. In no field should they be more properly evaluated than in the genesis and maintenance of the physical, mental, and moral health of the family. There have been admitted 690 patients for social reasons, 413 for economic reasons, 3 have been referred to their own physicians for some special indication, and 25 have been refused admission, usually because they were already pregnant when they applied for admission.

At least three-fourths of this group has been comprised of women between twenty and thirty-five years of age. The modal age period has consistently been between twenty-five and thirty years. Patients have been admitted as young as sixteen years and as old as fifty-one years.

From the very onset more than 50 per cent of the patients of the series under consideration have applied for family regulation advice within the first ten years after their marriage.

Ten per cent of the series have applied for advice and treatment and have been accepted before they have ever experienced pregnancy. Significant components of this group are the premarital cases and those seen shortly after marriage. The largest single class when the division is made according to number of known pregnancies, 623 patients or 16 per cent of the series, has applied after completing their second pregnancy. Table I represents the reproductive life of these 4,000 women, both as to the number of known pregnancies and the number of children born alive.

It has often been variously and vaguely understood that contraceptive measures, as they are known today, by virtue of their complexities and the conscious effort required to conduct them, are dysgenic, in that socially and economically handicapped and so-called inferior classes will not avail themselves of such information nor practice the technic even after it is prescribed. No judgment is made as to inferior or superior classes, but sociologic data as to race, education, occupation of the husband, financial status, and housing conditions of the patients have been recorded to demonstrate that groups commonly considered socially and economically handicapped are found in the clinic's clientele in at least as large proportions as they are found in the general population of Cleveland.

Upon admission, the sociologic and gynecologic history of the patient is taken in detail. The pertinent gynecologic information considered in this study is that relating to the previous use of contraceptives. Fifteen per cent of the series are recorded as having had no previous experience with contraceptive practices. There is little doubt but that this percentage should be lower, since experience in eliciting the history in this particular has resulted in an ever decreasing number of patients who truly can be said not to have made some effort to control conception. In attempting to organize the group as to its previous contraceptive practice, Table II shows the statistics which have been obtained.

TABLE I. REPRODUCTIVE LIFE OF PATIENTS

NO. OF KNOWN PREGNANCIES	NUMBER OF CHILDREN BORN ALIVE																		TOTAL	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	NO.	PER CENT
0	384																		384	10
1	64	426	1																491	12
2	9	91	518	5															623	16
3	4	27	130	384	2														547	14
4	2	10	55	138	283	1													489	12
5	1	9	28	57	119	175	1												390	9
6		1	16	27	57	71	116	2											290	7
7		1	2	18	24	52	64	81											242	6
8		1	3	5	8	17	29	39	60	1									163	5
9		1	5	1	6	5	16	18	28	41									121	3
10				2	1	4	2	11	18	23	16	1							78	2
11		1		1	1	1	3	7	5	10	25	14							68	2
12			2			1	4	1	8	8	5	8	11						48	1
13				2		1	2	2	3	2	5	5	6	5					33	1
14				1				1		1	1	3	1	3	2				13	*
15							1	1		1		1	1						5	*
16					1		1			1		3		1	1				8	*
17				1							1							1	3	*
18													1						1	*
19																		1	1	*
21							1												1	*
26												1							1	*
Total	464	568	760	642	502	328	240	163	122	88	53	36	20	9	3			2	4000	100
Per cent	12	14	18	16	13	8	6	4	3	2	2	1	1	*	*					100

*Less than 0.5 per cent.

The routine of the clinic is to subject the woman to careful pelvic examination, determine the most suitable contraceptive technic, and teach the manipulation of any mechanical advice prescribed at the first visit. Various methods of contraceptive treatment are prescribed according to the indications. Preference is given to the diaphragm pessary used in conjunction with lactic acid jelly. Eighty-eight per cent of the group received such treatment. Other methods advised and the frequency of their prescription are represented in Table III.

Whenever an occlusive pessary is the method prescribed, the proper size is determined; the patient is taught to insert the device, to check its proper and correct application, and to remove it at the first visit. She is sent home to perfect her skill in applying the pessary before

TABLE II. PREVIOUS CONTRACEPTIVE PRACTICE

METHOD	NUMBER OF PATIENTS
Douche	468
Withdrawal or pessary	6
Withdrawal	1,188
Condom	685
Suppository	94
Contraceptive jelly	22
Pessaries (all types)	54
Continence	16
Condom or pessary	33
Withdrawal or condom	757
Other practices (postcoital voiding, straining, etc.)	68
Unknown	37
None	572
Total	4,000

TABLE III. METHODS PRESCRIBED

METHOD	NUMBER OF PATIENTS
Diaphragm pessary and lactic acid jelly	3,514
Diaphragm pessary or condom (both with lactic acid jelly)	59
Mizpah pessary and lactic acid jelly	67
Matrisalus pessary and lactic acid jelly	3
Dumas pessary and lactic acid jelly	3
Condom and lactic acid jelly	97
Condom and suppository	125
Withdrawal and lactic acid jelly	7
Withdrawal and suppository	2
Lactic acid jelly	29
Suppository	18
Condom or withdrawal	1
None	75
Total	4,000

the instructions are completed as to the actual practice of the technic. The usual time for the second appointment is one week after the initial visit.

In evaluating the results obtained with the practice of the contraceptive methods advised, it seems opportune to describe briefly the treatment proffered and to analyze the series into its components according to yearly admissions with correlation of the number of cases considered active as of January, 1934.

Several types of occlusive pessaries have been prescribed for these patients. By far the most commonly employed type has been the round spring diaphragm pessary. The size of these pessaries, as expressed in the diameter of the device measured in millimeters, has varied greatly, from size 60 to size 95, but sizes 80 and 85 have been more frequently used. Many patients have been fitted with diaphragm

pessaries with the flat spring rim of the Mensinga style. Among the pessaries of the cervical cap type, the Mizpah has usually been employed. A very few patients have been equipped with Dumas pessaries. Most cases in which a Matrisalus pessary with its characteristic supporting rim might have been indicated have seemed better treated with a Mizpah pessary or mechanical protection for the husband. In every instance the pessary is prescribed to be applied with lactic acid jelly in apposition to the cervix and plentifully applied to the rim in its entire circumference. With scarcely an exception the pessary has been fitted with its concave surface uppermost. Great effort has always been expended to teach identification of the cervix through the occluding pessary. This has almost always been possible. A very few patients have been unable to perform this check of the cervix, usually because of an obese abdominal wall or short intravaginal portion of the cervix. The very inaccessibility of the cervix has made it less likely to elude the inserted diaphragm pessary which is the only type prescribed for such patients. A minimal postcoital interval of six hours is always advised before the pessary is removed and not then until after a douche of at least a quart of plain warm water has been taken. Pregnancies have apparently occurred when the technic has been varied by removal of the device immediately or very shortly after intercourse or by removal of the pessary even after a considerable period of time has elapsed without douching. Preference is given the fountain syringe as the instrument for douching, although careful douching with the bulb syringe has been permitted. Emphasis is always given to the superiority of the reclining position in douching.

The wife has always been equipped with some spermacidal preparation when condoms have been prescribed for the husband. Preference has been somewhat in favor of suppositories over jellies as being easier to manipulate. The patient is directed to insert the spermacidal agent ten minutes before coitus to allow ample dispersion of the medicament. The suppositories are of cocoa butter base, containing as the most active ingredients quinine and salicylic acid. Care is exercised always to dispense a fresh, carefully compounded preparation, capable of prompt dispersion. Whenever jelly has been prescribed in this series as an adjunct to the condom, a formula with 1 per cent lactic acid and 5 per cent boric acid in a glycerite of starch base has been given. In almost every instance, the sheaths are of rubber and are intended to be used a single time only. Instruction is given as to the technic of testing, applying and removing the condom. An immediate vinegar douche is advised in the event the condom is broken in the vagina.

In the few cases in which the spermacidal activity of a jelly or suppository has constituted the only treatment prescribed, a douche

has usually not been advised until several hours after coitus. Lately, with increasing frequency, an immediate vinegar or acetic acid douche has been prescribed. The suppository has almost always been of the type described above. The jelly has almost always been the lactic acid jelly previously mentioned, although in a few cases, a jelly containing chinosol has been used.

TABLE IV

	CORRELATION OF CASES ADMITTED AND CASES ACTIVE, JANUARY, 1934		
YEAR	NO. ADMITTED	NO. ACTIVE JAN., 1934	PERCENTAGE OF ACTIVE CASES
1928-1929	225	36	16%
1929-1930	285	65	23%
1930-1931	536	147	27%
1931-1932	1026	412	40%
1932-1933	1043	573	55%
1933-Jan., 1934	885	850	96%

There are 1,760 women using the method prescribed at the clinic, regularly and to the exclusion of all other methods; 1,504 have abandoned the method. Of this number, 151 have discontinued the advice and treatment as given at the clinic for natural causes, such as death of either husband or wife, sterilization of either partner, either surgical or climacteric, separation or divorce. There have been 1,353 who have deliberately discarded the technic advised. The reasons given by this group for abandoning the method are varied but some uniformity prevails. The commonest reason for discontinuing the method advised is the effort involved. The majority of this group may be considered as having resorted to coitus interruptus as being much less bother. Some of the patients have become dissatisfied because of discomfort or actual pain sustained with the use of some mechanical device. Usually the husband has incurred the discomfort and almost always when the complaint is against the diaphragm pessary it is due to faulty application by the wife and can be promptly and entirely relieved by further instructions. Sometimes too large a pessary has been prescribed. Occasionally there is some idiosyncrasy to constituents in the jelly used in conjunction with the pessary. These difficulties need only to be appreciated by the physician to be relieved. Discomfort to the woman herself in the matter of the occlusive pessary may be due to similar causes and is amenable to similar relief. In the presence of pelvic inflammatory disease a properly fitting diaphragm may be intolerable, and hence the method becomes unsuitable. When the difficulty is entirely subjective and no objective symptoms are to be discovered, its relief is not nearly so certain. A word or two to the patient before sending her away to commence the practical use of the method prescribed as to the possibility of other treatment in the event the method advised seems unsuitable or

incompatible is having the definite reaction of recruiting fewer women to this truly large proportion of unimproved patients. Certain it is that effort needs always be directed to the end that simpler contraceptive measures be developed as may be consistent with a high percentage of efficiency, freedom from physical or psychic trauma and dissociation with fertility when and as conception is desired.

There have been 221 patients discharged, usually because they have moved out of town, occasionally because they have been transferred to private physicians' care. In forty-six instances, there has come a time when the patient presented herself for examination and diagnosis, suspecting conception has occurred. No positive diagnosis of pregnancy could be made at the time the patient was seen, and these patients are represented in Table V as cases of questionable pregnancy. No further information is available in this group.

TABLE V. OUTCOME OF 4,000 PATIENTS ADMITTED FOR CONTRACEPTIVE TREATMENT

OUTCOME	NUMBER OF CASES
Used successfully	1,760
Discontinued voluntarily	1,353
Discontinued for natural causes	151
Discharged	221
Pregnancy ensued	469
Questionable pregnancy ensued	46
Total	4,000

There have developed 469 pregnancies in the entire series of 4,000 cases. One hundred and twelve of these are pregnancies commenced before the patient began the contraceptive advice prescribed at the clinic. The majority of these pregnancies were already established but not recognized by the physician in the admission pelvic examination. Occasionally pregnancy has ensued even after the method of choice has been determined but before instruction has been completed so as to make its protection available to the women.

Twenty-six pregnancies have been planned. The women in this group have been protected for varying periods of time and have discontinued the method prescribed to permit of conception. Frequently conception has occurred the first month the patient discontinued her contraceptive program. With the exception of two cases, one using condom and lactic acid jelly and another using Lucarol jelly and acetic acid douche, the routine technic of the diaphragm pessary and lactic acid jelly has constituted the contraceptive program that has been interrupted. One patient has interrupted her contraceptive treatment to achieve two planned pregnancies, resuming it after delivery each time to space her pregnancies. Fourteen of these twenty-six patients have returned to the clinic after completing the planned pregnancy to engage again in such contraceptive practice as may be prescribed.

There have developed 231 pregnancies because the patients have discontinued the method prescribed. Many times the lapse of the prescribed technic has been very brief, as when the patient has been out of supplies, but conception has occurred very promptly with the interruption of the contraceptive program. Fifty-nine women have failed because they have erred in the technic of conducting the prescribed method, as in failing to cover the cervix with the occlusive pessary, neglecting to use spermacidal jelly, removing the pessary too soon, or failing to douche as directed. Three instances of faulty technic with condoms are included in this group. Those pregnancies occurring from failures in technic do not belong among failures of the method, for the errors in technic are avoidable.

Forty-one instances of pregnancy are recorded as failures of the method prescribed. In this group are considered all inexplicable pregnancies. In some of these forty-one cases the history has been inadequate to assign any cause for the pregnancy, and they have been included as failures of the method rather than jeopardize the integrity of other groupings. Some of these failures might be avoided in the future with increased skill in the matter of determining the most suitable contraceptive treatment for various indications.

TABLE VI. CLASSIFICATION OF PREGNANCIES AS RELATED TO CONTRACEPTIVE TREATMENT

REASON FOR PREGNANCY	NUMBER OF CASES
Planned	26
Pregnant before commencing technic	112
Discontinued Mizpah pessary	2
Discontinued diaphragm pessary	211
Discontinued pessary or condom	2
Faulty technic with pessary	56
Faulty technic with condom	3
Discontinued condom	11
Discontinued spermacidal jelly	3
Discontinued suppository	1
Discontinued withdrawal or suppository	1
Method failed	41
Total	469

The value and necessity of routine check-up after the patient has been using the method three months is made a matter of concern to patient, doctor, nurse, and referring agent wherever possible. The follow-up of the nursing staff is intensive to the end that this return shall be effected. At the three months' routine reexamination, many difficulties may come to light. Such are usually easily removed at this time, before the patient sustains failure, prejudice, or indifference. Sometimes the method needs to be supplanted, sometimes the size of the pessary needs to be altered, particularly if the fitting has been done premaritally or early in the postpartum career, and sometimes the technic needs to be corrected. Patients are seen routinely

at yearly intervals by the physician for examination after the first check-up. More frequent return appointments are arranged as the physical or psychical indications warrant. Under such conditions, fewer patients have discontinued methods prescribed. Careful pelvic examination is a routine procedure with each subsequent reexamination. Much gynecologic disease is encountered in such a large group over the period of time they are active in the clinic. Such patients are directed to private physicians or dispensaries for treatment as indicated in the individual case.

SUMMARY

1. A statistical report of 4,000 patients admitted to the Maternal Health Clinic of Cleveland over a period of six years for family regulation advice, is presented.

2. Sociologic data are at hand to show that classes commonly considered socially and economically handicapped are represented in the series in at least the proportion they occur in the city's population.

3. Seventy-two per cent of the patients have been admitted for health reasons; 17 per cent have been admitted for social reasons; 11 per cent have been admitted for economic reasons.

4. At least 85 per cent of the patients are recorded as being already engaged at the time of their admission in some type of contraceptive practice.

5. Some type of occlusive pessary has been prescribed as the most suitable treatment in 88 per cent of the cases.

6. Forty-one in a group of 4,000 cases have sustained inexplicable pregnancies and are considered failures of the method prescribed; 231 have become pregnant through discontinuing the method; 59 have conceived through misapplication of the method.

25 PROSPECT AVENUE

Horowitz, E. A., Derow, D., and Bierman, W.: Temperature Determinations in the Female Pelvis During Diathermy, Am. J. M. Sc. **189:** 555, 1935.

By means of a vaginal electrode equipped with a thermometer, the vaginal temperature was observed during 255 pelvic diathermy treatments. With thermometers in the cervix, bladder, and rectum, the temperatures developed in these parts were found to follow closely the vaginal temperature, averaging but 1 or 1½° F. lower. The bladder urine was also heated to a high degree. Hence, the vaginal temperature is a true indicator of the temperatures attained in adjacent tissues. Mouth temperatures and pulse rates were elevated in 80 per cent of the treatments. Also the ineffectiveness of "transpelvic diathermy," by external plate electrodes, as a method of pelvic heating, was once more demonstrated.

J. THORNWELL WITHERSPOON.

STATISTICAL STUDIES ON PUERPERAL INFECTION

I. Some Factors Influencing the Incidence of Puerperal Infection

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(From the Department of Obstetrics, Johns Hopkins University and Hospital)

THE problem of puerperal infection is still far from its ultimate solution, as evidenced by the fact that its fatalities still rank first in maternal mortality statistics. Undoubtedly, in the light of present knowledge, the majority of these deaths are preventable, as demonstrated by a number of reports which have recently appeared from various clinics presenting a very low incidence of puerperal infection and a minimum of deaths due to it. Unfortunately, any attempt to compare these figures with those of other clinics is impossible since no universal standard is employed as the criterion of a morbid case. Furthermore, temperature readings are often not recorded routinely after the third day of the puerperium in cases which have hitherto been afebrile. The greatest discrepancy, however, lies in variations of clinic clientele, since it is obviously inexact to compare morbidity incidence in a private hospital with one in which the patients are chiefly of the ward group, or an institution accepting only "booked" cases with one having a large emergency service. Also, the incidence of infection will be lower in a hospital accepting all patients requesting admission than in a small teaching clinic limited to those women presenting definite obstetric abnormalities.

It is the latter type of institution, however, which is in the best position to study the effect of these complications upon the incidence of puerperal infection. The Department of Obstetrics of the Johns Hopkins Hospital accepts approximately 1,500 admissions a year and among them abnormal cases make up a high percentage. It is important to note that only about 7 per cent of the delivered patients are private, the remainder being about equally divided between white and colored women of the lowest social status, over three-quarters of them being unable to contribute anything to defray hospital expenses. Normal multiparas are not admitted and many normal primiparas have to be refused due to lack of beds. Moreover, at least 10 per cent of the total admissions constitute emergency and often neglected cases. Fifteen per cent of the white and 45 per cent of the colored patients have some degree of pelvic contraction and 12 per cent suffer from a toxemia of pregnancy. These facts demonstrate that the clinic clientele is comprised chiefly of women whose physical, mental, and social status render them unsatisfactory obstetric subjects. They do, however, make up a series of cases affording an

excellent opportunity to investigate the effects of obstetric abnormalities upon puerperal infection. Such an analysis is recorded in the subsequent pages of this paper.

It should be stated that the criteria employed for the diagnosis of a febrile puerperium are as follows: a temperature (mouth) of 100.4° F. or above on any two days of the puerperium, not necessarily successive, and excluding the first twenty-four hours after delivery. The temperature is determined every four hours throughout the patient's stay in the hospital, regardless of the absence of clinical signs or symptoms of infection. The fever is classified as being due to puerperal infection only in the presence of definite signs and symptoms characteristic of that condition and only after other causative factors such as pyelitis, mastitis, or respiratory infection have been ruled out.

The series under analysis includes 5,767 consecutive cases delivered at or near term on the Obstetric Service of the Johns Hopkins Hospital. About 7 per cent of the patients were private, and of the ward material, there were more black women than white, 55.26 and 44.74 per cent, respectively. Considering the great number of abnormal cases, the operative incidence was low, being 19.30 and 22.64 per cent in the black and white races, respectively.

The influence of the following factors on the incidence of puerperal infection have been investigated.

TABLE I. THE INCIDENCE OF PUERPERAL INFECTION AS AFFECTED BY RACE, AGE, AND PARITY

FACTOR	INCIDENCE PER CENT PUERPERAL INFECTION		
	WHITE	BLACK	TOTAL
Race	11.05	20.24	16.13
Age			
To 16	15.93	26.67	24.10
17-19	15.06	22.26	19.80
20-24	10.51	19.27	15.26
25-29	7.47	13.60	10.24
30-34	8.39	20.11	12.71
35 and over	11.95	17.46	13.03
Parity			
1	13.74	23.19	19.16
2	5.31	16.93	12.06
3-4	8.83	12.77	10.72
5-8	6.67	13.86	9.85
9 and over	14.61	22.81	17.81
Total multiparas	7.48	15.40	11.61

Table I and Fig. 1 illustrate the differences in the incidence of puerperal infection according to the race, age, and parity of the patient. It will be noted that the condition was observed almost twice as often

in the black as in the white race. In a number of other statistical studies previously published by the author from this Clinic, it has been found that the black woman is in almost every way a poorer obstetric risk than the white. The maternal mortality rate is significantly higher in the colored race, and it is our experience that most of this discrepancy is in terms of deaths due to puerperal infection.

There is a definite correlation between the age of the patient and her risk of infection after delivery. This is not to be explained entirely in terms of a disproportionately large number of primiparas with a resultant high operative incidence in the younger age groups, since a similar decrease in infection with advancing age is observed if primiparas alone are considered. It will be seen that the incidence of infection in-

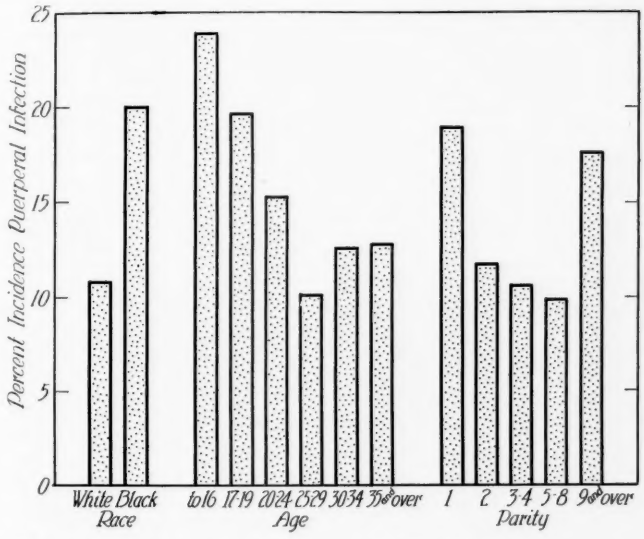

Fig. 1.—The incidence of puerperal infection as affected by race, age, and parity.

creases in women aged thirty and above and in the group para ix and over. Whether or not these findings portray an accurate picture is not clear, but they do coincide with our experience that the "grand" multipara is in many ways far from being an ideal obstetric risk.

It is felt by many that a deplorable tendency of modern obstetrics is the trend toward radicalism as evidenced by the high incidence of operative deliveries. That such a routine carries with it an increased hazard to the mother due to a high incidence of puerperal infection is illustrated in Table II and Fig. 2. It is interesting to note that even a perineal tear or episiotomy, although immediately followed by repair, increases the incidence of infection to a significant degree. Moreover, the operative group, although consisting chiefly of such simple procedures as

forceps and breech extractions, shows an infection rate almost three times as high as the group "spontaneous, no tear." Operations requiring intrauterine manipulation, such as version and manual removal of the placenta, naturally resulted in a higher incidence of infection than the simpler procedures just mentioned, and the dangers so often attributed to the latter procedure are amply illustrated in the table.

Table III and Fig. 3 illustrate the striking correlation between the incidence of puerperal infection and the duration of labor. It should be noted that the infection rate increases most rapidly as labor becomes prolonged past normal limits, a fact which is partially explained by the

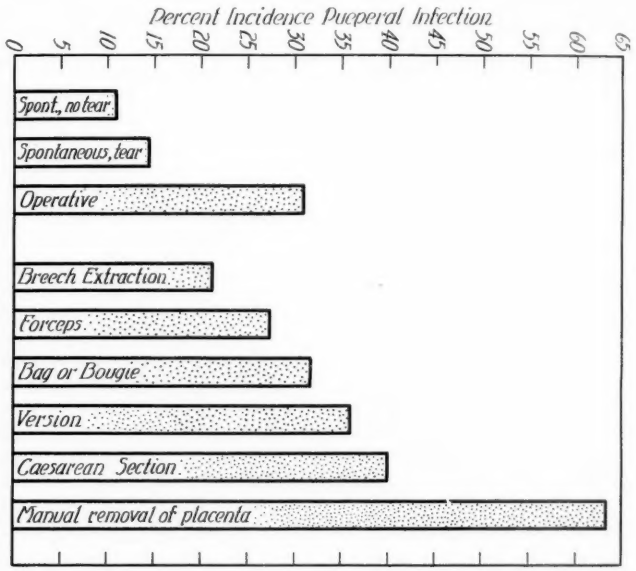

Fig. 2.—The incidence of puerperal infection as affected by the type of delivery.

great number of operative deliveries in these groups. The effect of prolonged labor is further emphasized by the fact that in those patients whose puerperium was normal, the mean duration in hours was three and a half hours shorter than in the group with a subsequent puerperal in-

TABLE II. THE INCIDENCE OF PUERPERAL INFECTION AS AFFECTED BY THE TYPE OF DELIVERY

DELIVERY	INCIDENCE PER CENT PUERPERAL INFECTION		
	WHITE	BLACK	TOTAL
Spontaneous, no tear	7.08	13.85	11.06
Spontaneous, tear	9.26	19.39	14.51
Operative	21.75	39.51	30.86
Breech extraction	20.65	21.74	21.20
Forceps	19.08	36.77	27.22
Bag or bougie	28.13	37.50	31.82
Version	26.58	45.57	36.08
Cesarean section	26.83	47.89	40.18
Manual removal of placenta	57.14	75.00	63.64

fection. Moreover, it may be stated that the incidence of prolonged labor (thirty hours or more) was over twice as high in the infected as in the normal group, and was 17.72 and 7.92 per cent, respectively.

It was rather expected that an increased incidence of puerperal infection would be found in patients who waited until late in labor before seeking admission to the hospital. Table IV shows that such was not the case, although infection occurred in over three-fifths of the women upon whom attempts at delivery had been made in the home prior to their admission. It seems probable that the time of admission has little effect upon the subsequent course, despite the figures shown in Table IV,

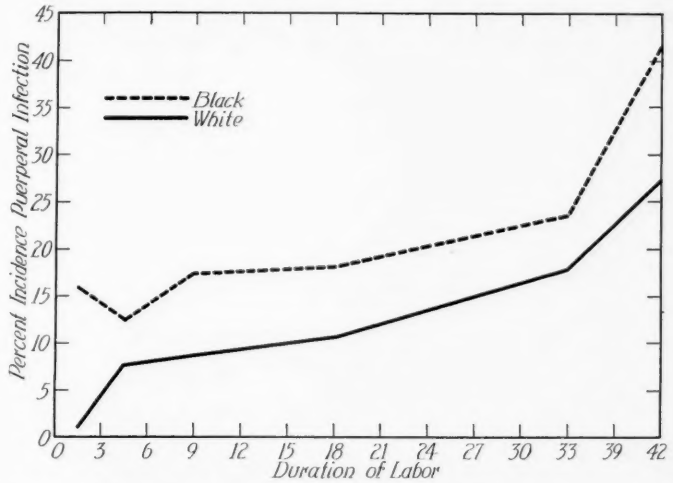

Fig. 3.—The incidence of puerperal infection as affected by the duration of labor.

since a great many of those patients admitted to the hospital prior to the onset of labor presented definite abnormalities; and the incidence of induction of labor and operative delivery was high in this group.

TABLE III. THE INCIDENCE OF PUERPERAL INFECTION AS AFFECTED BY THE DURATION OF LABOR*

	INCIDENCE PER CENT PUERPERAL INFECTION		
	WHITE	BLACK	TOTAL
HOURS DURATION			
0- 2	1.19	16.00	9.24
3- 5	7.50	12.40	9.88
6-11	8.74	17.23	13.12
12-23	10.50	18.15	14.93
24-41	18.15	23.34	21.32
42 and over	27.27	41.61	36.45

Mean Duration of Labor	PUERPERAL INFECTION	PUERPERIUM NORMAL
White	17 hr. 30 min.	13 hr. 43 min.
Black	18 hr. 4 min.	14 hr. 49 min.
Total	17 hr. 49 min.	14 hr. 17 min.

*Omitting cesarean section and unknown.

Table V shows that in this series there is no increase in the incidence of puerperal infection as the result of rupture of the membranes prior to the onset of labor. Those patients in whom the premature rupture of the membranes occurred spontaneously were usually admitted to the ward at once, and there awaited the onset of labor. However, in a rather large percentage of this group, artificial puncture of the membranes was performed in order to induce labor, and the resultant low morbidity rate adds further confirmation to the recent experience of this Clinic that with proper care premature rupture of the membranes does not add materially to the hazards of the patient. The highest incidence of infection was observed in the group "rupture during the first stage of

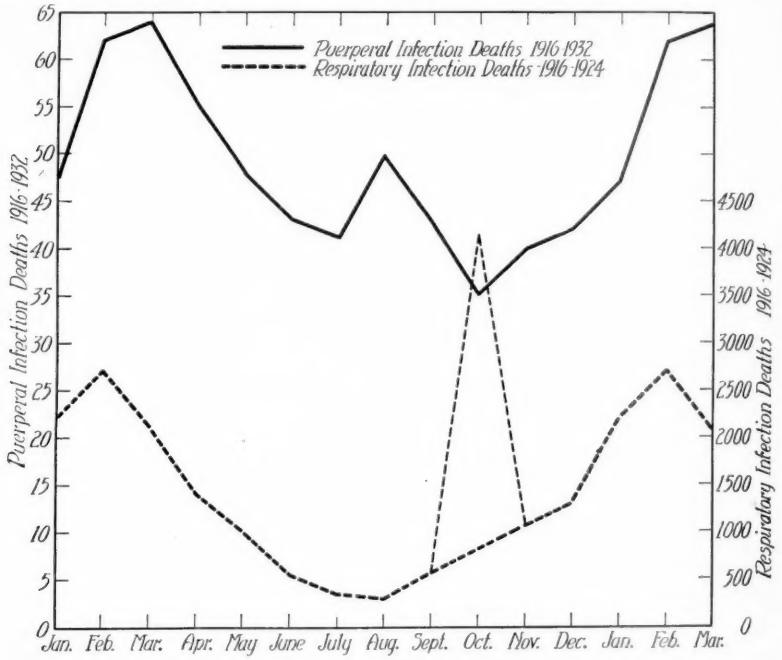

Fig. 4.—A comparison of deaths due to puerperal infection and respiratory infection in the city of Baltimore.

labor." This is probably explainable since spontaneous rupture during the first stage is frequently associated with some abnormality of labor, presentation, or position, and when artificial rupture of the membranes

TABLE IV. THE INCIDENCE OF PUERPERAL INFECTION AS AFFECTED BY THE TIME OF ADMISSION TO THE HOSPITAL

TIME OF ADMISSION	INCIDENCE PER CENT PUERPERAL INFECTION		
	WHITE	BLACK	TOTAL
Before labor	15.49	25.56	21.39
Early in labor ($<$ 3 cm.)	11.01	21.77	17.03
Late in labor ($>$ 3 cm.)	9.27	16.77	13.29
After attempts at delivery	20.00	87.50	61.54

is carried out in the first stage it is usually done in an attempt to speed up an already unsatisfactory or prolonged labor.

The influence of some medical and obstetric complications on the incidence of infection during the puerperium is shown in Table VI. Despite the general lowering of body resistance coincident to chronic cardiac disease no increase in the morbidity rate was observed in cases with this complication. A high rate of puerperal infection in patients whose pregnancy was complicated by pyelitis was to be expected, and the effect of syphilis on infection rates generally is well known. Whether there is a

TABLE V. THE INCIDENCE OF PUERPERAL INFECTION AS AFFECTED BY THE TIME OF RUPTURE OF THE MEMBRANES

TIME OF RUPTURE	INCIDENCE PER CENT PUERPERAL INFECTION		
	WHITE	BLACK	TOTAL
Before onset	8.59	17.79	12.85
First stage, spontaneous	13.21	21.79	17.95
First stage, operative	15.38	33.90	26.53
First stage, total	13.37	22.84	18.63
Second stage, spontaneous	9.13	16.89	13.47
Second stage, operative	9.98	17.89	14.50
Second stage, total	9.46	17.29	13.89

TABLE VI. THE INCIDENCE OF PUERPERAL INFECTION AS AFFECTED BY VARIOUS MEDICAL AND OBSTETRIC COMPLICATIONS

COMPLICATION	INCIDENCE PER CENT PUERPERAL INFECTION		
	WHITE	BLACK	TOTAL
Cardiac disease	11.36	10.00	10.81
Pyelitis	27.50	41.18	33.78
Syphilis	58.33	24.72	26.50
Toxemia	24.14	28.64	26.48
Placenta previa	10.00	55.56	27.08
Premature separation	10.53	47.62	30.00
Postpartum hemorrhage	16.43	25.96	21.24
Contracted pelvis	13.49	22.92	20.64
Total Clinic population	11.05	20.24	16.13

definite increase in puerperal fever coincident with the toxemias of pregnancy or whether the observed high figure is due solely to a high rate of operative deliveries in this group is not clear. Considering that almost every patient with placenta previa and premature separation of the placenta is delivered operatively, the rates noted for these two complications do not seem high. It is probable, however, that the effect of blood loss on lowering the resistance of the patient to invasion by pathogenic bacteria plays some rôle, and this supposition is strengthened by the increased infection rate in cases with postpartum hemorrhage. The actual effect of a high incidence of operative deliveries on otherwise uncomplicated cases is shown by an infection rate of 20.64 per cent in those women evidencing varying degrees of pelvic contraction, a figure 4.5 per cent above that of the general clinic population. In cases of

pelvic contraction with spontaneous delivery, the rate was only 12.26 per cent, which approximates closely our general experience with this type of delivery.

SEASONAL VARIATION

Through the courtesy of Dr. Huntington Williams, Commissioner of Health for the City of Baltimore, it was possible to obtain figures correlating on a monthly basis the deaths from puerperal infection and respiratory infection in the above community. The results of this analysis are portrayed in Fig. 4. The curve of deaths due to respiratory infection is similar to others previously published, and the October peak, of course, is due to the influenza epidemic of 1918. It will be noted that the curve of deaths due to puerperal infection parallels very closely that of respiratory diseases, except that it follows the latter in all characteristics by about a month. It is our opinion that this finding, although not new, is important, since it emphasizes the close correlation between the frequency of respiratory diseases and the frequency of puerperal infection, a fact not generally given sufficient prominence.

In contrast with the above observation no similar monthly or seasonal variations in the incidence of puerperal infection could be elicited although figures were obtained on a series of 25,000 consecutive deliveries. When charted, the monthly incidence varied considerably with an irrational saw-tooth appearance. The reason for these rather contradictory findings is not clear unless one postulates alterations in virulence of the infecting organisms at the time when respiratory diseases are at their height. Further studies on larger series of cases would seem necessary to clear up this point.

SUMMARY AND CONCLUSIONS

An effort has been made to investigate statistically certain beliefs, most of them well established clinically, concerning the factors which influence the incidence of puerperal infection. It seemed that this could best be done by analyzing a series of cases with a high potential infective risk: i.e., a ward service from the lower social strata with a large number of medical and obstetric abnormalities. The results of this analysis are as follows:

1. The incidence of puerperal infection was almost twice as high among black as contrasted with white patients, being 20.24 and 11.05 per cent, respectively.

2. A definite and steady decline in infection rate was noted with advancing age of the patient up to thirty years. In the higher age groups a secondary rise occurred, but it is felt that this finding is probably an artefact due to a higher incidence of complications in this group.

3. A similar decline in incidence was observed with advancing parity, except in the group para ix and over. It is believed that here the secondary rise was due to the same cause as noted above, since patients of such age and parity would not

have been accepted as hospital material unless some abnormality necessitated it. The total infection rates for primiparas versus multiparas were 19.16 and 11.61 per cent, respectively.

4. The puerperium was febrile due to intrauterine infection two and a half times as often when the delivery was operative as when it was spontaneous, the figures being 30.86 and 12.26 per cent, respectively. Even the presence of a perineal tear or episiotomy with immediate repair caused a definite increase in infection as contrasted with the rate obtaining where no laceration occurred. The puerperium was febrile in almost two-thirds of those cases in whom manual removal of the placenta was necessary. In general, the risk of puerperal infection in operative cases seemed to be in direct proportion to the amount of intrauterine manipulation involved.

5. The incidence of puerperal fever increased directly with the duration of labor and the rate of increase was most rapid after the labor became prolonged. In those patients developing infection, the average length of labor was three and one-half hours more than in the group whose puerperium was uneventful.

6. It was impossible from the figures assembled to make out a case for the admission of patients early in labor. However, the situation is quite different in women admitted after attempts at delivery in their homes had failed, for 61.54 per cent of them developed puerperal infection.

7. The incidence of puerperal fever was lowest in the group of patients whose membranes ruptured either spontaneously or artificially prior to the onset of labor, although the rate obtained when rupture took place during the second stage was only 1 per cent higher. The most unsatisfactory results occurred when rupture took place during the first stage of labor.

8. An increased rate of infection occurred in the presence of most medical and obstetric abnormalities. To a great extent this increase paralleled the high incidence of operative deliveries due to the complication. It would seem that excessive blood loss either before or after delivery increased the incidence of infection in terms of a lowering of general resistance.

9. The death rate from puerperal infection for the city of Baltimore showed a seasonal variation similar to that observed for deaths due to respiratory diseases, except that the curve of the former followed the latter by about a month. However, no similar seasonal variation was observed in the incidence of puerperal infection, although figures were analyzed from a series of 25,000 deliveries. It is possible that seasonal variation in the virulence of invading bacteria provides the explanation for this discrepancy.

Santoro, Giuseppe: Report of Two Hundred Blood Transfusions, Calabria Medica **1:** 13, 1935.

The author reports on 200 blood transfusions administered during 23 years of practice, both in America and in Italy, for obstetric and gynecologic indications with only four cases of deaths. He reviews the literature in reference to new blood transfusion methods.

The author now adheres to the simple indirect citrated blood method initiated with venoclysis of glucose solution. However, he proposes to experiment with Becart's electrical transfuser and the Henry-Jouvelet transfusion apparatus.

He calls attention to the decided value of blood transfusion in operations for cancer, myofibroma, and also as a prophylactic and active treatment in puerperal infections and in anemic women following prolonged and massive hemorrhage.

AUGUST F. DARO.

THE INFLUENCE OF MENTAL ATTITUDES IN CHILDBEARING*

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(From the Departments of Obstetrics and Gynecology and of Psychiatry, College of Physicians and Surgeons, Columbia University)

THIS paper deals with a study of emotional factors affecting pregnancy and labor. The study began last fall in the clinic of Sloane Hospital and is a cooperative effort of the Departments of Obstetrics and Psychiatry. One object of this work has been to investigate the importance of emotional factors as a cause for difficult labors in physically normal women. It is based on the hypothesis that the emotional attitudes and conflicts of civilized women are an important element in making their labors long and severe. We hope to learn whether this hypothesis is correct and, if it is, what can be done to correct the situation.

An equally important purpose may appear of less interest to the obstetricians. It should not, for our work already suggests that they may be the mental hygienists of the future. For reasons to be discussed later, the period of the first pregnancy appears to offer a unique opportunity for actual mental hygiene. Our second objective has been to investigate this possibility.

The work to date has amounted to but little more than a survey of the situation and no conclusive results are yet available. Professor Cheney suggested, however, that a preliminary report be made now, to include something of the events and reasoning which led to the work being undertaken. He seemed to feel that the obstetricians, as a result of their special studies and experience, would be interested in the conception and gestation of a brain child.

PART I. EMOTIONAL FACTORS IN HARD LABORS

The work began, in a sense, when I was a medical student. We were then informed that primitive women usually had easy labors, civilized women hard ones; and that the difference was due to the better physical condition of the primitive women. This explanation did not satisfy me. In women with normal pelves only the faulty coordination of the muscles of the uterus and perineum interfered with the easy exit of the child. I could not understand why the muscle fibers ahead failed to relax while those behind were contracting, as occurs in normal defecation and other muscular functioning.

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*Read, by invitation, before the Section of Obstetrics and Gynecology, The New York Academy of Medicine, May 28, 1935.

I wish to express here my appreciation of the support of Professors Watson and Cheney and the chiefs of the two clinics, Doctors Joseph Draper and Robert McGraw. The nurses and other workers in the clinics have also been thoroughly helpful.

One of my obstetric cases was interesting in this connection. The mother, a multiparous negress, seemed to have almost complete control over her labor. Upon arrival at the patient's home, we found no evidence that labor had begun, but she delivered a very large child in less than an hour with no evidence that it was any ordeal.

Circumstances, a few years later, revitalized the question. I had been sent to British Guiana, South America, to conduct a health campaign, and during fifteen months of my time there I lived on the edge of the jungle with a tribe of Indians for neighbors. From their chief I learned a very important fact about Indians: they love to tell "tall" stories; and the stranger who accepts these will certainly come home with a well-assorted stock of misinformation. I did not ask him about childbirth among his people because he was one of the worst liars I have met.

But I also lived for some time with Mr. Howard King, a magistrate, who had spent most of his life among the Indians of the colony. In his home, and elsewhere, I met other men who had had similar experience. From such men I learned about the habits and customs of the aborigines of the colony, including knowledge of reliable literature.

These men, and the authors they recommended, were agreed that easy labor was the rule among the Indian women. The custom of couvade prevailed. The women never rested after the event but the buck would take to his hammock for ten days to fool the evil spirits and draw them away from the newborn child. During this time the squaw took care of the baby, the father, and herself, and showed no signs that she was not fully capable of doing so.

The general statements of the ease with which the women bore children were backed up with numerous incidents of which the following, known personally to Mr. King, is a fair sample:

> An Indian woman, paddling alone in her dug-out canoe, felt labor coming on. She paddled to the bank of the river, had the child, cared for it, reembarked and paddled the twenty miles which lay between her and her camp. She showed no sign of weakness when she arrived, and he was sure this and similar incidents were not evidence of Indian stoicism. Labor was not an ordeal.

I saw enough of the Indian women to learn that they were emphatically not in better physical condition than civilized women. They were, on the contrary, mostly in very bad condition. Hookworm disease and malaria were rife among them. Syphilis was very common. They went around with bare abdomens, and it was nothing unusual to be able to see the edge of their spleens from a distance of ten feet. Hemoglobin counts as low as thirty were found and the average was about fifty. The average coastal Indian woman of British Guiana could not survive labor if it were the ordeal it commonly is among women in this country. They had easy labors, but not because of good physical condition. Reports from other places where health conditions were better showed that it was not a matter of physical development at all. The cause lay in some other field.

Eventually, after I entered psychiatry and learned of the power of the emotions to effect bodily changes, I began to suspect emotion as the cause; the hypothesis already stated began to formulate itself. I then found myself in need of some criterion by which to judge it, something paralleling Koch's postulate in bacteriology. No such thing existed, so I finally invented one. I decided that even tentative acceptance of the hypothesis as a basis for research required evidence to answer at least two questions:

Question 1. Have emotions power to cause the incoordination of muscular action which seems to be the cause of prolonged, severe and painful labors in physically normal civilized women?

Cannon[1] shows that acute emotional disturbances are capable of causing various profound bodily changes in cats and dogs. Of particular interest here are the effects of such disturbances on unstriped muscle, the type found in the uterus. Embarrassment causes a relaxation of the circular fibers of the arterioles, resulting in blushing. Fear may cause contraction with blanching of the skin. Both fear and rage completely inhibit the movements of the gastrointestinal tract with the result that the normal forward movement of the food is completely stopped.

Clinical observations and the results of psychotherapy seem to prove, in cases of spastic constipation, that the emotional state of the patient is the cause of spasticity and this, in turn, prevents the normal forward progress of the feces. The same effect on the unstriped muscles involved in labor would prolong it and make it more difficult. Clinical observations and the results of psychotherapy seem to prove that many cases of dysmenorrhea are due to chronic emotional disturbances. Dysmenorrhea is directly analogous to the early phase of labor.

With regard to striped muscle, it is common knowledge that fear in some individuals causes spasm. Such persons become "stiff with fear" and cannot move. The same effect, to a lesser degree, is observed in severe self-consciousness which prevents the normal relaxation of opposing muscle groups and results in jerky, awkward movements such as are common in young, shy adolescents. An example more pertinent to our subject has been found in certain women in whom the emotional attitude toward coitus causes a spasm of the sphincter muscle of the vagina which makes the passage of the penis very difficult, painful, or even impossible. A similar spasm of all the voluntary muscles which can resist the outward passage of the infant could be an important factor in increasing the severity of labor.

Another general fact seems deserving of mention. All other physiologic functions such as eating, coitus, defecation, and so on, are naturally pleasant and easy. Most of them, however, are made definitely unpleasant and disgusting; the usual ease with which they naturally occur

may be completely destroyed by the development in the individual of certain emotional attitudes in connection with them. Analogy suggests that labor should be naturally pleasant and easy and, when it is not, the common cause of a similar state affecting other functions should be taken as the most likely cause until proved otherwise.

These items all appear to indicate that emotional disturbances are capable of making labors harder, longer, and more painful.

Question 2. Is there, between primitive and civilized women, a difference in emotional attitudes toward labor sufficient to account for the difference in the average severity of their labors?

Our study of women in their first pregnancies has already revealed various attitudes including the following:

1. *Euphoria.*—This is fairly common. Women showing this appear to be in a permanent state of elation. Questioning reveals that the euphoria covers numerous fears. Patients will admit such fears and disclose that they are making every effort to avoid thinking about them. For this latter purpose they concentrate on the happier side of pregnancy and maintain the superficial euphoria.

2. *Fear of the Ordeal of Labor.*—Every patient seen to date has eventually disclosed this fear in varying measure. Investigation shows that it is built up from early childhood by the mysterious allusions of mothers and other adults to "what mothers go through" in bearing children, together with the general mystery which is developed around the whole subject of sex. This attitude of mystery, highly developed in our civilization, makes labor appear almost a ghostly function and, as such, to be approached only in terror.

3. *Fear of Loss of Freedom.*—This fear has previously arisen in relation to the decision to marry, but comes up at this time with renewed vigor. Before children are born complete freedom may be regained by separation and divorce, but after the birth of a child the mother is committed to give the next twenty years to its care.

4. *Fear That the Marriage May Not Succeed.*—Because the birth of the child cements the marriage, this fear becomes prominent in cases where good adjustment between husband and wife has not occurred.

5. *Fear of Inability to Live Up to the Ideal of Motherhood.*—With the approach of their first labor, many women realize that they are not the saintly creatures, with almost divine powers, that mothers are supposed to be. They hope that the miracle will occur, in connection with labor, to make them over into the traditional mold, but still have their doubts and fears. These are focused on the labor.

6. *Fears of the Influence of Heredity.*—If the prospective mother knows that members of her family have had hard labors, she fears she is destined to have a similar one. If she is aware of delinquency, crime, mental, or physical disease in the families of herself or husband, she fears any or all of these may be transmitted to her child. She fears, as a result, to see her child and this leads her to fear the labor which will bring it forth.

7. *Fear Growing Out of the Belief That Childbearing Should Be a Martyrdom.*—This is a curious but very powerful belief, reinforced by religious doctrines. It makes women feel that pain and travail are prerequisites to true motherhood. Its power was illustrated in the historical incident with which you are probably all familiar. When Simpson discovered chloroform and began to use it in obstetrics, the clergy rose in arms and had almost succeeded in getting a bill through Parlia-

ment prohibiting anesthesia in labor when Queen Victoria interfered. We are likely to think that such beliefs have now disappeared because they are seldom discussed, but investigation shows that they are extant and still very powerful.

8. *Resentment.*—In some cases resentment against the husband, or nature, has been evident. The mother had not wished to become pregnant at that time, or circumstances which developed later made it appear unfortunate, as in the case of a woman whose husband was found to have a serious illness shortly after pregnancy began.

These emotional reactions, usual in civilized women, either do not exist at all or they are of slight importance in primitive women. There is, therefore, a great difference between the emotional attitudes of civilized and primitive women with regard to labor, because pregnancy represents to the civilized woman a complete and permanent change in status.

It may be noted that most of the emotional reactions mentioned would occur with greater intensity in reference to the first labor, which suggests a possible reason why first labors are commonly longer and more difficult. In view of these facts, the hypothesis seemed worthy of further investigation.

TREATMENT OF FEARS RELATING TO LABOR

A practical point with regard to the fears previously mentioned: In many cases they are covered with varying degrees of euphoria. In the next group we find them appearing as fears of the labor itself. In obstetric practice they would, ordinarily, be treated with reassurance regarding the outcome of the labor. Such treatment might not touch the real cause of the fears. It might, instead, tend to cover them more thoroughly than ever and so be worse than no treatment at all. Adequate treatment is possible only after the real meanings of the fears have been elicited. Diagnosis is essential in treating fear just as it is in treating physical disorders.

One example will make this clear. The patient had said she feared labor. Discussion revealed that she was in conflict over assuming the responsibilities of motherhood. She feared the ordeal of labor far less than she did its successful outcome. But she felt that a prospective mother should not entertain any thoughts and feelings which were in conflict with the traditional belief that children are an ineffable blessing. She had, therefore, repressed her feeling of rebellion from her consciousness. Further discussion was followed by a realization that while motherhood had its trials, there were also compensations and, following this, she seemed less fearful and more content. Reassurance might have given temporary relief, just as morphine relieves pain. It would not have had a beneficial effect on the cause and might have had an adverse effect.

PART II. PREVENTION OF MENTAL DISEASE

Psychiatrists working with children have recognized for some years that many of the mental conditions from which their patients suffered were caused by emotional disturbances in the home. These, in turn, ap-

peared to derive from the internal conflicts of the individual parents. Emotional states, in brief, are contagious. This contagion, in such forms as the hysterias which develop in war time and those which lead to mob violence generally, are familiar to all of us. Children are particularly susceptible to this contagion and reflect, as a result, the emotional atmosphere of the home as it is focused onto them.

Recognition of the importance of the parental attitudes and conflicts led to efforts to treat the parents who brought children to psychiatric clinics. It was found, however, that this is difficult in practice. The pathologic situation has commonly developed too far; the parents have not only convinced themselves that they are blameless, but that their own disturbances are caused by the other parent or the child himself. Many parents will refuse to consider the possibility that they require treatment. Others admit it in words but prove very resistant. Under such circumstances, treatment often proves unsatisfactory.

In this state of resistance, parents usually back up their arguments by quoting various popular and unsound beliefs. They insist that the child's nervousness or misbehavior is the result of an injury to the head, the influence of bad boys in the neighborhood, temptation by the devil, the hereditary transmission of evil or weak traits (usually through the other parent), and other similar and unproved causes. When these are not accepted by the psychiatrist, the mother falls back upon the familiar defense that the psychiatrist, after all, is not a mother and only mothers can understand their children.

Study of such parental emotional states and the unsound beliefs behind which they were barricaded showed that they derived from the grandparents and were inculcated during the infancy of the parents. They were, therefore, present in the parents before the marriage and birth of the children. Could they be elicited and treated before they had become so firmly established and before they had seriously damaged either the marriage or the children? The search for a time and place where this might be done led to the tentative choice of the prenatal clinic and the limitation of the work to apparently normal women in their first pregnancies. With one exception, the women were seen only on their regular prenatal visits to the clinic.

Even somewhat superficial studies of fifteen apparently normal women revealed conflicts and beliefs and attitudes in each of them which have been recognized as causes of marital discord. Slightly more than half claimed to be sexually frigid. Most of them admitted, and the rest showed other evidence, of the belief that the martyrdom of labor would confer on them the right and power to dominate the family. Most of them, even those who admitted feeling better than ever before in their lives, were already demanding all sorts of special consideration from their husbands and others simply because they were pregnant.

One intelligent woman had previously recognized this characteristic of pregnant women and had resolved that when she became pregnant she would not take advantage of the situation. Up to about two weeks before labor she succeeded. Then, for about a week, she demanded from her husband and sister-in-law (a nurse who had come to stay with her through the labor), all the attentions usually given a seriously ill person, a small child, or a queen. She was fully aware at the time, she reported afterward, that her attitude and demands were utterly unjustified, and yet she could not stop herself.

Of attitudes and beliefs known to have deleterious effects on children, the following were among those elicited: Most of the women were overemphasizing the importance of what they did, as if it were they, and not nature, which was producing the child. It is not the policy at Sloane, in the case of normal women, to lay down any strict regime. Many of the women had expected this and felt that if they failed to take special care of themselves, ill effects would be visited upon the children. They believed, in brief, that both the pregnancy and labor should be a martyrdom. But they also expected a reward for undergoing this. They believed it would confer on them a special kind of wisdom with regard to their own children, a mystic sort of knowledge transcending any which might be learned by those who had not been initiated in childbearing. One sensible, former school-teacher admitted, after discussion, that this was a superstitious belief which had nothing to do with reality. She added that she had seen plenty of ignorant mothers who mishandled their children badly but still adhered to this belief regarding themselves. Most of the women, in varying degrees, believed that both their husbands and children would be eternally indebted to them and expected perpetual future devotion because of "what mothers go through" in bearing children. This set of beliefs is a basic cause of later difficulties, because it leads mothers to mistreat their children and make impossible demands on both them and the husband.

Another related belief gave rise to fear and conflict in some cases. Some of the women disclosed strong fears of abnormalities, mental or physical, in the forthcoming child. These were based on the belief that previous acts of the woman were sinful and would be punished by such visitations. One of the case reports which follow deals with a case of this kind, and the same element entered into the other case.

The women supplied convincing evidence that society in general makes every possible effort to prevent the pregnant woman from accepting pregnancy and labor as a natural physiologic function. The same amount of attention to eating would make most of us have nervous indigestion. Columnists and fiction writers make much of their "blessed events." Mothers, husbands, other relatives, and friends do their best to make the woman feel that she is going through an unusual and dangerous experience. Even strangers, in some of the cases, had gone out of their way to tell the woman some terrifying story of childbirth. All of which tends to make the woman feel important and different from ordinary

human beings. If she, as a result, later tells us that mothers have a different and superior understanding of their children, we can blame her only for accepting what society has thrust upon her, for this is a logical outgrowth of such efforts. At least part of the women were trying hard to resist this stream of suggestion, but it is very powerful.

FRIGIDITY

Our cases of frigidity supplied evidence on the etiology. None of our cases gave any support to the popular idea that this condition results from lack of consideration or faulty technic on the part of the husband. All of the women reported, on the contrary, that their husbands had made every effort to satisfy them throughout the marriage. One woman volunteered that she believed she would be more likely to respond if her husband would stop bothering about her reactions. She explained that his attitude took away all spontaneity and made coitus seem a task.

Neither did frigidity appear to be a primary cause of conflict but rather a result of emotional conflicts and beliefs of the women relating to the subjects of sex and marriage in general, or their own particular marriages. All of these appeared to have been developed during the childhood and adolescence of the women and therefore long before they had even met their husbands.

One of these was the belief, fostered by parents and teachers, that nice women should not and do not have sexual desires and feelings. The increasing freedom of speech and behavior granted to young women in recent years does not usually change this belief, because it has been inculcated and repressed years earlier. Even a conscious contrary belief does not necessarily correct it.

Another important deterring belief includes a fixed mental picture of the joys of coitus which develops out of the romantic ideas and beliefs we commonly inculcate in girls and young women. Love stories all emphasize the point that the consummation of true love brings with it an adequate reward regardless of outside circumstances. The girl logically concludes that the joy of this consummation is something wonderful and almost beyond mental conception. She tries to imagine what it may be like and, out of this, builds an anticipation which is beyond the possibility of satisfaction in reality. Then, when the reality fails to meet this false conception, she feels disappointed and frustrated. In one patient, who recovered, this seemed to be the sole cause.

A third cause has been mentioned in connection with fear of the first labor, namely, the fear that they have made a mistake in deciding to marry or in the choice of a mate. To these women successful coitus is a symbol of successful marriage. They believe that having orgasms commits them to the marriage. Then, doubting whether they want to be

thus committed, they express this doubt in frigidity as if they wanted to maintain a ready exit from the marriage in case their fears and doubts should later be confirmed.

A fourth cause seemed to be more simple, the belief that conception could not occur without an orgasm. This cause was operative in at least one case in which the woman had wanted to postpone pregnancy. Another patient showed that the belief was derived from her mother. This prospective grandmother argued with the daughter that she must have had an orgasm, insisting that otherwise pregnancy could not have occurred.

CASE REPORTS

CASE 1.—A quiet, somewhat introverted woman of twenty-eight who had not talked very freely. She had admitted some fear of labor but seemed unable to discuss this. About two weeks before labor was due she came in complaining of numbness in her right hand and particularly in her right middle finger. No physical cause for this could be discovered and the possibility of an hysteria arose. She was asked to consider the finger for a few minutes and tell me anything which entered her mind. At this she showed signs of extreme embarrassment but would say nothing for some time. She finally admitted that she had masturbated during the latter part of the four-year engagement. She felt that this was a terrible thing to have done and believed it might have damaged her internal organs. This, she feared, would have some ill effect on her child.

The subject was discussed during the two interviews previous to her labor. In the second, the importance of clearing up her false beliefs on the subject was mentioned. She was told that without this she would be very likely to be oversuspicious of the child and always expecting him or her to indulge in improper sexual activities. She agreed that this was correct. She had been watching the small son of a friend a few days earlier. When this boy put his hands anywhere near his genitals, she felt that the mother was very remiss for not stopping him. She said she knew this was foolish but had been unable to change the feeling that the boy was a masturbator. Psychotherapy appeared to result in a partial cure.

Such an attitude persisting in a mother is known to have bad effects on the child, and her own reactions were so extreme that they appeared capable, if unrelieved, of causing serious mental disease in her.

CASE 2.—The patient was formerly a teacher in a small town in New England and had been married but a short time when the pregnancy occurred. On her first visit she had insisted that her marriage was perfect and wonderful. She later admitted a failure to enjoy coitus. Discussion disclosed some degree of the feeling that nice women should not enjoy such things, together with a greater degree of doubt regarding the wisdom of her marriage. She had not yet made any friends in New York, and she missed her work and the pleasures of rural life she had previously enjoyed. In the effort to make herself believe the marriage perfect she had not allowed herself to think about these things and, as a result, was acting in coitus as if she were still unmarried. She was asked to consider whether she felt, after weighing the one against the other, that she had gained more than she had lost by the marriage and decided she had gained. She reported on the following visit that the frigidity had disappeared.

She brought up a question of her own on this visit. She reported that she and her husband had agreed before marriage that the only way to have a satisfactory child was by developing a mental image of the child in advance and then carefully holding this image while indulging in coitus to cause its conception. But concep-

tion had accidentally occurred before they intended, and they now feared that their child, conceived as a result of carnal pleasure, would be unsatisfactory, perhaps bestial or deformed. The manner in which germ cells mature by discarding half of their genes was described to show that inheritance is determined some time before coitus occurs, which the woman accepted as proof of the falseness of their belief. At her request, the husband was also seen and the subject discussed with him.

The importance of eliciting and attempting to correct a belief of this sort can hardly be overemphasized. Otherwise the child will be rejected by the parents before birth, and such rejections are a source of great emotional disturbances in both parents and children.

RESULTS

Nineteen patients, all primiparas, had undergone labor at the time of writing. The average time of their labors was sixteen hours and fifteen minutes as compared with the average of eighteen hours given in textbooks, a decrease of one hour and forty-five minutes. None of these patients were seen by the psychiatrist during their labors. Both Watson and Draper suggested the need for this but other duties of the author have made it impossible. The number of cases is too small to prove anything but the decrease in time, especially without treatment during labor, is encouraging.

We also feel more hopeful regarding the efforts to prevent future mental disturbances. Final results should be measured only after the women and their families have been followed over a period of years in order to measure, as far as is humanly possible, the degree of emotional disturbances against the average in the same number of untreated mothers. We are now attempting to work out a rough yardstick for this purpose. Definite manifestations of disturbance such as behavior problems in the children and separations of parents will receive the most attention.

But even without this proposed follow-up, we feel that we accomplished something. In both cases reported there was evidence that a definite decrease in emotional tension occurred. In the second case the woman voluntarily reported that the whole atmosphere of the home had been changed for the better. Whether these changes will persist only time will show.

Three cases of sexual frigidity cleared up during the prenatal period. All of the women who complained of this condition were taught that it was their own disability which could be treated psychiatrically if it persisted, and appeared to accept this. Even this should prevent part of the evil results that commonly follow the persistence of the condition because most women eventually decide that the fault lies with their husbands and begin to blame them. From this to separation, divorce, and seeking a new mate are but short steps. The women seen may, instead, seek treatment for themselves.

An effort was made to teach all the women that misbehavior on the part of their prospective children would mean that they or others who handled their children were suffering from emotional disturbances which

the children were reflecting; that the greatest need in such a situation was for psychiatric treatment of the parents. The alibis usually advanced by parents were discussed and every effort made to discredit them as common real causes. Available information regarding the natural tendency of children to behave well, if permitted to do so, was also discussed in the effort to relieve the women of the feeling that they were about to enter upon a task of making naturally bad creatures over into good ones. Information regarding places to get help for either physical or mental disturbances of the children was given on request. The immediate response to this sort of teaching was apparently good. The women showed considerable interest and some of them seemed to find relief for some of their worries about child raising. We believe, as a result, that we have laid groundwork which may prevent them from allowing disturbances in the home to develop to a point where they are as hard to treat as those which now commonly come to the psychiatric clinics. In some cases we may have relieved conflicts which might have become serious. This seemed true in both the cases reported.

CONCLUSIONS

1. The wealth of material elicited seems to indicate the need for more work along similar lines.
2. The women should be followed through their labors by the psychiatrist.
3. More husbands and other relatives should be interviewed either at the clinic or perhaps in their homes by a psychiatric social worker.
4. Machinery should be set up for following the families over a period of years for two purposes: (a) To evaluate the results of preventive measures, and (b) to offer additional aid if it is indicated.

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30 EAST FORTIETH STREET

Tata, Giuseppe: The Bactericidal Power of Blood Serum, Riv. ital. di ginecol. **17:** 533, 1935.

Based upon the study of 29 pregnant tuberculous women from the Umberto I Sanitarium of Rome, the author observed that contrary to what is verified in those affected with pulmonary tuberculosis without pregnancy, the bactericidal power of the blood serum against Koch's bacillus is constantly and noticeably diminished in pregnant patients.

Despite the damaging effect of pregnancy upon the system of immunity in the tuberculous patient, the author infers from his experience that when pregnant women enjoy the benefits of treatment in a sanatorium, a majority of them will go to term without further damage.

AUGUST F. DARO.

A RECORD OF 26 CASES OF RUPTURE OF THE UTERUS

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RUPTURE of the uterus is one of the serious accidents of pregnancy and labor which should, in the great majority of instances, be a preventable condition. The indiscriminate use of pituitary extract during labor, manual dilatation of the cervix, the employment of internal podalic version in neglected or ill-managed cases, and the widespread practice of cesarean section have kept the frequency of this alarming complication of parturition far too high. Its incidence is a fair index of the type of obstetrics practiced in a given community. Asa B. Davis[1] has brought out the fact that the hospital incidence is greater than that for the community at large, because complicated and neglected cases gravitate to hospitals. Fourteen of twenty-six cases of uterine rupture occurring in the Boston Lying-In Hospital from January, 1918, to January, 1935, were emergency cases and cannot be charged against the hospital clinic. This group includes five cases of rupture of cesarean scar in patients who were originally operated upon elsewhere.

The average frequency of this condition is probably in the vicinity of 1 rupture to 2,000 deliveries. Out of 142,625 estimated actual confinements at the New York Lying-In Hospital, Davis[1] found an incidence of rupture of the uterus as 1 in 810. Hurd[2] reported an incidence of 1 in about 2,000 deliveries at the Woman's Hospital in New York; 5 of 9 cases were due to version and breech extraction, while 4 occurred spontaneously in women who had previously been subjected to cesarean section or myomectomy. From 1918 to 1934, inclusive, there were 47,554 deliveries at the Boston Lying-In Hospital, among which there were 26 cases of uterine rupture, an incidence of 1 in 1,829. There were 12 cases entirely attributable to hospital management, an incidence of 1 in 3,963. There were 17 cases of traumatic rupture, while 9 originated spontaneously. Six of the latter occurred in cesarean scars.

ETIOLOGY

Rupture of the uterus is a disease of multiparity. DeLee[3] states that it occurs in multiparas eight times more often than in primiparas. In this series of 26 cases, only two were primigravidas.

The average parity for the entire group was approximately 5. The mean age incidence was thirty-three years. The number of living children per patient was 2.8.

Of 731 internal podalic versions performed at the Boston Lying-In Hospital during the period under investigation, 12 resulted in rupture of the uterus, an incidence of 1 to 61. A considerable number of the

TABLE I. RECORD OF PARITY

Primiparas	2		
Multiparas	24	3 or more pregnancies	19
		5 or more pregnancies	16
		7 or more pregnancies	10
		8 or more pregnancies	5
		10 or more pregnancies	2

TABLE II. RECORD OF PRESENTATION, POSITION, ENGAGEMENT, AND CERVICAL DILATATION IN 17 CASES OF TRAUMATIC RUPTURE

PRESENTATION		VERTEX PRESENTATIONS				DILATATION OF CERVIX	
		POSITION		ENGAGEMENT			
Vertex	6	L.O.A.	3	Floating	1	Complete	9
Transverse	5	R.O.P.	2	High	4	Incomplete	8
Breech	2	L.O.P.	1	Mid	1		
Nonviable	2			Low	0		
Face	1						
Brow	1						

TABLE III. DELIVERY RECORD IN 17 CASES OF TRAUMATIC RUPTURE

INDICATION FOR DELIVERY		ATTEMPTED METHODS		ULTIMATE TYPE OF DELIVERY	
Lack of progress	5	High forceps	3	Internal podalic version and extraction	12
Fetal distress	3	Craniotomy	3	*Accouchement forcé and extraction	2
Maternal distress	2	Pomeroy maneuver	1	†Braxton Hicks version	1
Prolapse of cord	2	Decapitation	1	Breech extraction	1
Inevitable miscarriage	2	Manual rotation of head	1	‡Spontaneous delivery	1
Prolapse of arm	1				
Placenta previa	1				

*Inevitable miscarriages.
†Placenta previa.
‡Rupture as a result of manual extraction of placenta (Case 10).

TABLE IV. LABOR RECORD IN CASES DELIVERED BY VERSION

DURATION OF LABOR		DURATION OF RUPTURE OF MEMBRANE	
PRIMIPARAS	MULTIPARAS	PRIMIPARAS	MULTIPARAS
51 hours	90 hours	12 hours	65 hours
	25 hours		49 hours
	24 hours		9 hours
	17 hours		7½ hours
	15 hours		3½ hours
	14 hours		2½ hours
	12 hours		2 hours
	7½ hours		1 hour
	7 hours		
	6 hours		
	2 hours		

versions were performed for delivery of twins and for extraction of premature or nonviable infants, which means that the likelihood of rupture as a result of version at term in a desperate situation is comparatively great.

CASE REPORTS

TRAUMATIC RUPTURE

CASE 1.—(Hospital No. 24191.) 1918. Mrs. C., aged thirty-two, gravida vi, para vi, was admitted at term as an emergency case, in active labor of fourteen hours' duration. She had had one cesarean section, followed by two pelvic deliveries; the first terminated spontaneously, and the second by forceps. Examination revealed a transverse presentation (R. SC. P.). An arm had been prolapsed approximately nine hours. She was in marked shock; the pulse was barely perceptible. The uterus was of ligneous consistency. The fetal heart was absent. The flanks were dull to percussion.

Vaginal examination, under ether anesthesia, revealed a shoulder impacted in the pelvis. Decapitation was unsuccessfully attempted. Craniotomy was then performed, but the head could not be delivered as the cranioclast continually slipped off. An internal podalic version, however, was accomplished without difficulty.

Intrauterine examination revealed a large rent in the posterior wall of the lower segment through which intestines were palpated. The uterus was packed after manual extraction of the placenta. A supravaginal hysterectomy was performed twenty-eight hours later. The patient died thirty minutes after operation, without transfusion.

CASE 2.—(Hospital No. 25892.) 1919. Mrs. D., aged forty-five years, gravida v, para v, was admitted at term, as an emergency case, in active labor of twenty-four hours' duration. Examination disclosed a transverse presentation. A contraction ring obviously was impeding labor. The fetal heart tones were inaudible. The patient was in shock; the pulse was 124, temperature 99°, and respirations 40 to 50.

At pelvic exploration, the cervix was found to be one-half dilated. The dilatation was completed manually. The baby was delivered by internal podalic version and extraction. The breech was turned with great difficulty, although no particular trouble was encountered in delivery of the trunk and shoulders. Very strong traction on the neck would not dislodge the head, which seemed to be wedged in the pelvic brim. It was finally delivered with forceps after craniotomy had been performed.

Internal examination revealed the lower uterine segment completely torn across, and the examining hand could be inserted directly into the peritoneal cavity. A supravaginal hysterectomy was performed forty hours after rupture, but the patient died four hours and twenty minutes later, without transfusion.

CASE 3.—(Hospital No. 27867.) 1921. Mrs. G., aged thirty-seven years, gravida vi, para vi, was followed in the prenatal clinic. She was admitted in active labor, with a vertex presentation (L. O. P.). The baby seemed unusually large. The cervix was one-half dilated. The fetal heart became irregular after seventeen hours of active labor. Delivery was decided upon, but in attempting to convert the position to R. O. A., a loop of cord prolapsed and was found to be pulsating feebly. Internal podalic version and extraction were accomplished with great difficulty. The baby was stillborn and weighed 14½ pounds. The cervix was sutured to control bleeding, but the uterine cavity was not explored. The temperature and pulse rose steadily after delivery, the former going to 103°, and the latter to 120. Death occurred on the seventeenth postpartum day as a result of general peritonitis and septicemia.

Autopsy revealed a rupture of the uterus posteriorly into the pouch of Douglas, and a second rupture into the perirectal tissues.

CASE 4.—(Hospital No. 28007.) 1921. Mrs. McL., aged twenty-four years, gravida iii, para iii, admitted after an unsuccessful attempt at forceps delivery at home. She had been in labor ninety hours; membranes ruptured sixty-five hours. Vertex presentation, head high. The cervix was fully dilated. Forceps was again

used without success and the operator discovered a contraction ring. An attempt was made to stretch the contraction ring manually. Internal podalic version was then chosen as the means of delivery, but this was most difficult. The cord was severed during the process of turning the baby, and it was necessary to do a craniotomy in order to deliver the after-coming head which, after delivery, was found to be hydrocephalic. There was an extensive laceration of the cervix, extending into the vaginal vault and broad ligament. This was sutured per vaginum, but the patient succumbed in five days to peritonitis and bronchopneumonia.

CASE 5.—(Hospital No. 27937). 1921. Mrs. H., aged twenty-six years, para i, was sent to the hospital by the family physician who had performed four vaginal examinations during labor without the use of gloves and had twice attempted to deliver her. She had been in labor fifty-one hours. The uterus was of boardlike consistency on entry, and pus was coming from the vagina. A definite contraction ring was palpable. The temperature was 103°, and the pulse 104. The pelvic measurements were small and the outlet contracted. An anterior face presentation was diagnosed. Fetal heart was not heard. A craniotomy was performed and the baby delivered with the cranioclast. It was then discovered that there were twins. The second baby was delivered by internal podalic version and extraction; it was necessary to perforate the after-coming head to facilitate its delivery. The placenta was manually extracted. A complete laceration of the perineum was unsutured because of the patient's poor condition. She died of shock and sepsis seven hours postpartum. The uterus was ruptured transversely in the lower segment.

CASE 6.—(Hospital No. 28797.) 1922. Mrs. L., aged twenty-eight years, gravida viii, para vii, was fully dilated two hours without progress. The pelvic measurements were normal. The position was R.O.P. and the station of the head midpelvis. An attempt was made, under full ether anesthesia, to rotate the head manually to the R.O.A. position. A loop of umbilical cord prolapsed down into the vagina during this maneuver. Version was then decided upon. The head was suddenly felt in the left iliac fossa during the process of turning the baby. The operator's hand was then inserted through a rupture of the lower segment and the version completed. The placenta was manually extracted. The patient was immediately transferred to the hospital by ambulance without uterine tamponade. She was in extreme shock on entry, and was pulseless. A transfusion was given during a supravaginal hysterectomy. At laparotomy, the laceration was found to extend from the left side of the cervix up into the left broad ligament. Drains were inserted into the pelvis through the vagina and the lower end of the abdominal wound. She made a good convalescence. The baby was discharged, with the mother, in good condition.

CASE 7.—(Hospital No. 29176.) 1922. Mrs. M., aged thirty-six years, gravida viii, para viii, was delivered at home after a fifteen-hour labor. The membranes had been ruptured forty-eight hours. Pelvic measurements were normal. Four vaginal examinations were performed during labor. There was no progress after the cervix became one-half dilated. The cervix was manually dilated. A brow presentation was found, but the head could not be flexed because of two loops of cord about the baby's neck. The uterus was dry and was shut down tightly about the baby. The head was pushed up and a version done with "very great difficulty." The baby's right humerus was fractured and one leg lost considerable skin during the extraction. The baby, however, was easily resuscitated, and it survived. The mother went into profound shock at delivery. The pulse was 150, feeble, and irregular. The placenta was expressed by Credé. Examination showed the uterus completely torn off anteriorly in the lower segment. She was sent to the hospital without uterine tamponade and died before a transfusion could be given.

CASE 8.—(Hospital No. 29220.) 1922. Mrs. O., aged forty-two years, gravida vii, para vii, was sent to the hospital as an emergency case. She had been in active labor for six hours prior to her admission, during which time she was under the care of a physician who apparently had attempted to deliver her. She had one living child, while five had died by the second day of unknown causes. She was very weak on admission. The pulse was 150 and of poor quality. There was free vaginal bleeding. A loop of cord and one arm were prolapsed. Internal version was done with considerable difficulty. Following expulsion of the placenta there was profuse bleeding, and uterine tamponade was resorted to. There was moderate staining through the pack for two days, when fecal material began to discharge from the vagina. There was vomiting and abdominal distention on the following day. Death occurred on the fourth postpartum day after the development of signs of pneumonia at the left base. Two transfusions were given during the puerperium.

Necropsy revealed a ragged rent, 6.5 cm. long, which extended through the upper part of the vagina and adjoining cervix on the right and opened into a large irregular abscess of many pockets in the right broad ligament.

CASE 9.—(Hospital No. 33118.) 1925. Mrs. F., aged twenty-seven years, gravida ii, para ii. This patient had a labor of eight hours' duration. The membranes had been ruptured two and one-half hours. The head was high, and the position was R.O.P. Pelvic measurements were normal. Pituitary extract, minims one and minims two, was given. The fetal heart subsequently dropped to 60. The uterus seemed tight. A high forceps delivery was unsuccessfully attempted through a rim of the cervix. The uterus seemed to relax under the influence of the anesthetic so a version was performed. "The head popped outside the uterus as the feet were being pulled down." Attempts at delivery from below were then discontinued and a laparotomy performed. In the interim, there was little vaginal bleeding. A stillborn infant was extracted by the abdominal route. There was a large rent in the anterior wall of the lower uterine segment at its junction with the cervix. The bladder was torn loose from its attachment to the uterus but was not ruptured. The rent was sutured in three layers and drains were placed in the posterior culdesac. She was given 500 c.c. of citrated blood. The convalescence was afebrile.

CASE 10.—(Hospital No. 36228.) 1926. Mrs. S., aged thirty years, gravida vii, para v. This patient in the thirty-sixth week was delivered normally of a stillborn, macerated fetus. The placenta had not separated three and one-half hours after delivery. The anterior lip of the cervix was torn transversely during manual extraction of the placenta, so that the operator's hand could be inserted into the anterior culdesac. The anterior uterine wall and intestine were palpated. The placenta was subsequently successfully extracted. The patient was then transferred to the hospital. The rupture was treated by suture of the cervix from below, followed by a supravaginal hysterectomy. Vaginal drainage was instituted. She made a satisfactory convalescence and was discharged in seventeen days.

CASE 11.—(Hospital No. 42337.) 1929. Mrs. J., aged forty-three years, gravida ix, para viii. There was a history of seven normal deliveries. This patient was admitted to the hospital at term, as an emergency case, with painless vaginal bleeding. Pelvic exploration revealed a partial placenta previa. The cervix easily admitted two fingers. The baby was presenting by the vertex, and the fetal heart tones were not made out. A Braxton Hicks version was performed. "With considerable traction, the baby was delivered, dead and macerated, in twenty minutes." The patient bled profusely from a laceration of the right side of the cervix, extending out into the broad ligament. The laceration was sutured from below. She received four transfusions subsequent to delivery, because of hemorrhage and shock, but died on the fourth postpartum day of peritonitis.

CASE 12.—(Hospital No. 41782.) 1929. Mrs. H., aged twenty-nine years, gravida vi, para vi, was admitted to the hospital in the fifth month of her pregnancy for the treatment of uterine hemorrhage. A diagnosis of inevitable miscarriage was made. In order to facilitate expulsion the membranes were artificially ruptured. Pituitary extract was administered intramuscularly. The cervix, twenty hours later, was one inch in length and admitted one finger. Manual dilatation of the cervix was chosen as the best procedure. The cervix was very resistant and "suddenly the hand could be put inside the uterus. Loops of bowel were palpated and brought down." The baby and placenta were then extracted. At laparotomy, a tear was found to extend from the right side of the cervix out into the broad ligament just posterior to the uterine artery. A supravaginal hysterectomy was performed, and drains were inserted through the cervix and into the posterior culdesac by the abdominal route. She developed peritonitis, ran a septic course, and was very sick, but recovered after thirty days without transfusion. The convalescence was complicated by anemia and pyelitis.

CASE 13.—(Hospital No. 50730.) 1931. Mrs. G., aged thirty-five years, gravida v, para v, was admitted at term, in active labor. The presentation was transverse, with the head in the left iliac fossa. The pelvic measurements were normal. Twelve inches of umbilical cord prolapsed soon after admission. Vaginal examination revealed full dilatation of the cervix. Internal podalic version failed because of a contraction ring. The cord stopped pulsating. Several attempts were then made at high forceps delivery, all failing because of the inclination of the symphysis. Version was again attempted. As this was unsuccessful, craniotomy was performed, but the cranioclast continually slipped off the skull. Version was tried a third time. After several attempts to push the head through the contraction ring, "a snap was heard and the head was then felt in the peritoneal cavity." A laparotomy was immediately performed and a stillborn infant, weighing 7½ pounds, was extracted. A transverse tear was found in the lower uterine segment, dissecting behind the bladder and communicating into the bladder at one point. A supravaginal hysterectomy was performed, and the ruptured area in the bladder was sutured. Vaginal and abdominal wicks were inserted. The patient, postoperatively, drained urine both by vagina and through the abdominal incision. An inlying catheter was placed in the bladder. She developed pneumonia, acute local peritonitis, and cystitis. One transfusion was given. She ran a febrile course for three weeks, the temperature varying between 100° and 102°, but she finally recovered.

CASE 14.—(Hospital No. 53604.) 1932. Mrs. H., aged thirty-one years, gravida x, para vii, was admitted to the hospital with premature rupture of the membranes and a breech presentation. Pelvic measurements were large. Sixteen hours later, castor oil and quinine were given, but labor did not begin until seventy hours after rupture of the membranes. After four hours of active labor the fetal heart became rapid, then slow and weak. Vaginal examination revealed the cervix three-fourths dilated, the breech high, and the position R.S.A. The dilatation was completed manually and was followed by an immediate breech extraction. The latter was difficult. The head was held up by the cervix but was finally delivered with Piper forceps. The baby gasped a few times, then died. The cervix was lacerated out into the vault. The laceration was sutured from below. Immediately after delivery the mother's condition was satisfactory. The blood loss was estimated at 100 c.c. One and one-half hours after delivery she bled vaginally and went into severe shock but responded well to the administration of 10 per cent glucose solution intravenously. One and one-half hours later she went into severe shock again, and died during the intravenous administration of fluid, before a transfusion could be started.

CASE 15.—(Hospital No. 12533.) 1933. Mrs. McD., aged thirty-four years, gravida iv, para iii, admitted to the hospital at term in active labor. She was very

obese; the abdomen was markedly pendulous. After twelve hours of labor, the cervix became fully dilated. The baby's head, however, did not descend into the pelvic excavation, even after rupture of the membranes. Two minims of pituitary extract were administered intramuscularly in an attempt to get the head into the pelvis. A prolonged severe contraction of the uterus resulted which did not relax until the patient was placed under full anesthesia. The patient's general condition was poor, as evidenced by cyanosis and a pulse rate of 150. Vaginal examination disclosed the baby's head above the brim. The umbilical cord was not pulsating. Craniotomy was attempted but the cranioclast continually slipped off the skull. Internal podalic version and breech extraction seemed to give no particular difficulty. Intrauterine examination revealed a complete transverse tear in the anterior wall of the lower segment. A transfusion was given and hysterectomy was performed. A gauze drain was placed down to the cervical stump. Vaginal drains also were inserted. The puerperium was febrile due to cystitis and an infection of the abdominal wound. She was discharged on the twenty-seventh postpartum day.

Case 16.—(Hospital No. 13341.) 1934. Mrs. O'T., aged thirty-three years, gravida vii, para iii, was admitted in the fifth month of the pregnancy for uterine bleeding of seven weeks' duration. The diagnosis was inevitable miscarriage. A No. 3 Voorhees' bag was inserted through the cervix, but labor did not ensue, even after the administration of pituitary extract in graduated doses. Twenty-four hours later the fetus was forcibly extracted through a cervix that was dilated only enough to admit two fingers. Examination of the cervix disclosed a laceration extending out into the broad ligament. The patient's pulse quickly rose to 136. Uterine tamponade controlled all bleeding until transfusion and hysterectomy could be performed. The convalescence was complicated by acute local peritonitis and an infected abdominal wound. She received a second transfusion on the seventh day, and was discharged from the hospital on the twenty-ninth day.

Case 17.—(Unit History No. 6950.) 1934. Mrs. P., aged thirty-four years, gravida vii, para vi, was admitted at term with a transverse presentation. The membranes ruptured at full dilatation of the cervix, following which an arm prolapsed. Internal podalic version was not difficult, but the extraction was complicated by a nuchal position of both arms. There was steady vaginal bleeding after expression of the placenta. Examination of the cervix showed a tear extending out into the right broad ligament. A supravaginal hysterectomy was performed and one transfusion given. The puerperium was afebrile.

Table V. Predisposing Causes in 9 Cases of Spontaneous Rupture

ETIOLOGIC FACTOR		PERIOD OF GESTATION
Previous cesarean section	5	Thirty-second to thirty-sixth weeks
Previous rupture	1	Thirty-sixth week
Pregnancy in a horn	1	Sixth month
Pressure necrosis and abruptio placentae	1	Term
Abortifacient (oil of tansy)	1	Thirty-fourth week

Case 20 demonstrated at repeated cesarean section an incomplete rupture, two inches in length, in the scar of the previous operation. The incision was extended to include the rupture. After extraction of the fetus and placenta, the edges of the rupture were freshened and sutured. This patient returned two years later when, at repeated cesarean section, a complete rupture of the scar was found (Case 22). Five of the ruptured cesarean scars were in the fundus and all ruptured four to six weeks before term, presumably as a result of weakness of the scar which gave way because of overdistention of the organ. There was a single case of rupture of a lower seg-

ment scar of the transverse type, which occurred after full dilatation of the cervix, following a sixteen-hour labor. (Case 26). This patient had been delivered by classical cesarean section the preceding year.

SPONTANEOUS RUPTURE

CASE 18.—(Hospital No. 28116.) 1921. Mrs. B., aged twenty-eight years, para i, was in labor twenty-two hours. The cervix was fully dilated and the head was on the perineum. The uterus was not relaxing well between contractions, so labor was terminated by a low forceps delivery. Catheterization before delivery revealed grossly bloody urine. The baby was stillborn. The placenta was expressed by Credé and showed an area of premature separation. A second degree laceration of the perineum was repaired at delivery. The patient complained of tenderness in the left costovertebral angle and in the left lower quadrant of the abdomen following recovery from the anesthetic. Urinary incontinence was noted and urine obtained from the bladder with a catheter was grossly bloody. Vaginal examination disclosed a laceration in the middle of the anterior lip of the cervix which extended on to the anterior vaginal wall. This tear gave a direct communication into the bladder. She died on the fifth postpartum day of peritonitis and extravasation of urine into the cellular tissue of the left broad ligament and left side of the pelvis.

Autopsy showed the anterior wall of the uterus torn upward from the cervix for a distance of 11 cm. This rent was to the left of the midline and communicated with the cavity formed by the separation of the layers of the broad ligament, and with the bladder. The anterior wall of the vagina presented an opening just superior to the cervix, 1 cm. in diameter, which communicated with the bladder. The pelvic mass and retroperitoneal cavity contained bloody urine.

The pathologist, Dr. Wolbach, reported: "The pelvic mass and continuous retroperitoneal cavity contained fluid which, though blood-tinged and turbid, was evidently urine. The walls of this cavity presented the characteristic appearance attending extrinsic urinary extravasation accompanied by infection. This extrinsic extravasation implies a rupture of the bladder at a time preceding delivery, otherwise escape of urine would have occurred through the channels revealed by the examination of the pelvic organs. It, also, seems improbable that the opening of the bladder, because of its nearly circular shape and restriction to the region of the trigone, could have been caused by a sudden application of force. It seems probable that a hematoma must have existed, and that the bladder communication was established by necrosis of the bladder wall subsequent to the hematoma and pressure. The origin of this hematoma probably arose from a tear in the uterus at the cervix."

CASE 19.—(Hospital No. 12361.) 1933. Mrs. McD., aged twenty-nine years, gravida ii, para ii, was admitted to the hospital in shock. For two days she had had abdominal pain, which became severe and constant six hours before entry. Subsequent history revealed that she had been taking oil of tansy for several days in order to bring about a miscarriage. Examination showed a tender, boardlike abdomen. There was no vaginal bleeding. At laparotomy a rupture of the uterus, 17 cm. long, was found behind the left cornu. The peritoneal cavity contained a large amount of blood. A stillborn infant was extracted by cesarean section, following which the uterus was amputated. One transfusion was given. Three days later there was bleeding from the abdominal wound. No single bleeding point could be discovered when the incision was opened. The tissues were so friable that on inspection a loop of bowel was perforated and stripped of its mesentery. Intestinal contents were inadvertently spilled into the peritoneal cavity. Twenty-four inches of intestine were resected and the abdomen closed with drainage. The patient died of general peritonitis. Autopsy revealed multiple perforations of the ileum. Extreme friability of tissues was by far the most notable finding.

Histologic studies revealed some degree of connective and elastic tissue change, but not to any remarkable extent.

CASE 20.—(Hospital No. 30854.) 1923. Mrs. H., aged thirty-five years, gravida ii, para ii, was admitted four weeks before term in active labor of three hours' duration. She had had a classical cesarean in 1922 after being in labor four days. The convalescence was unknown. On entry the uterus was relaxing well between contractions and was not tender. A repeat cesarean section was performed. On opening the peritoneum a blood clot was observed on the surface of the uterus, beneath which was a rupture two inches long in the old scar. The uterine incision was made to extend into this rupture, and was sutured in three layers after extraction of the baby and placenta. The patient had an afebrile convalescence, but she developed a puerperal psychosis.

(This patient was readmitted two years later with a rupture of the scar. See Case 22.)

CASE 21.—(Hospital No. 35364.) 1926. Mrs. V., aged twenty-five years, gravida v, para v, was admitted fourteen hours after the onset of severe abdominal pain which came on during an automobile ride. She had had two normal deliveries and two breech deliveries. She was now six months pregnant. She was in marked shock on entry, the temperature was 101.4°, and the pulse was 140. The abdomen was doughy, generally tender, and somewhat distended. A diagnosis of concealed hemorrhage was made. It was discovered at laparotomy that the top of the left horn of the bicornuate uterus was "blown off." The baby and placenta were lying free in the opening. The left cornu, fallopian tube, and ovary were excised. She was transfused with 600 c.c. of citrated blood. She vomited continuously for several days after operation. There was marked suppression of urine. The nonprotein nitrogen rose to 218 mg. per 100 c.c. of blood, and the blood urea nitrogen went to 128 mg. Fluids were forced and ten days later the nonprotein nitrogen was 48 mg. She then made an afebrile convalescence.

CASE 22.—(Hospital No. 34492.) 1925. Mrs. H., aged thirty-seven years, gravida iii, para iii (see Case 20). This patient was admitted at the thirty-sixth week of pregnancy in active labor of four hours' duration. The uterus was relaxing well between contractions which were coming at two-minute intervals. Because she had had a spontaneous rupture of the scar in her last pregnancy, a repeat cesarean section was performed. On opening the peritoneum, 500 c.c. of blood and clots were scooped out. The uterine scar was completely separated, exposing the placenta which was in part attached to the scar. The baby weighed 5 pounds and 15 ounces and made a good recovery. A supravaginal hysterectomy was performed. Blood transfusion was not deemed necessary in view of the patient's good general condition. She again developed a puerperal psychosis, but quickly recovered, and was discharged with the baby, on the seventeenth day postpartum, after having made an afebrile convalescence.

CASE 23.—(Hospital No. 36586.) 1926. Mrs. P., aged forty-four years, gravida xii, para xii. A cesarean section was performed in 1918 for toxic separation of the placenta, following which the patient was very sick. She was admitted eight years later with severe toxemia, the onset of which was in the seventh month. Interruption of pregnancy was advised, but she refused. She was admitted to the hospital one month later in shock and was pulseless, following the onset of severe, persistent abdominal pain. The abdomen seemed full of fluid. A transfusion was given. A complete rupture of the old scar was found at laparotomy, and the baby was free in the peritoneal cavity. A supravaginal hysterectomy was performed and another transfusion given. The temperature was 102° on the second day, but soon came to normal. She made a good convalescence.

CASE 24.—(Hospital No. 37827.) 1927. Mrs. H., aged thirty-one years, gravida ii, para ii. A cesarean section had been performed in the first pregnancy for "marginal placenta previa, contracted pelvis, and breech presentation." The pelvic measurements as obtained in the present pregnancy were normal. She was seized suddenly in the middle of the night, during the thirty-second week of her pregnancy, with severe abdominal pain. She was transferred to the hospital in marked shock. A laparotomy and transfusion were simultaneously performed. The scar was completely separated. The fetus and placenta were free in the abdominal cavity. A supravaginal hysterectomy was performed. The abdomen was closed without drainage. The temperature was 101° on the first and second days after operation, but then came to normal and she had a subsequent uneventful convalescence. She was discharged on the eighteenth postpartum day.

CASE 25.—(Hospital No. 43997.) 1929. Mrs. C., aged twenty-four years, gravida ii, para ii, was admitted as an emergency case at the thirty-sixth week of her pregnancy. She had had a cesarean section in 1925; the reason for the operation was unknown. The patient called in her family physician because she had abdominal pain and thought she was starting in labor. The doctor did a vaginal examination, then administered a hypodermic injection of pituitrin, following which she developed severe, persistent abdominal pain. She was transferred to the hospital twelve hours later and presented classical signs of concealed intraperitoneal hemorrhage. A complete rupture of the scar was found at operation. The fetus and placenta were free in the abdominal cavity. A supravaginal hysterectomy was performed. One transfusion was given. She had a prolonged, febrile convalescence, and developed wound sepsis, a pelvic mass, and intestinal obstruction, but finally recovered after fifty-nine days.

CASE 26.—(Unit History No. 3924.) 1934. Mrs. M., aged thirty-three years, gravida vii, para iii, entered the hospital for a repeat cesarean section. Six years before entry a Kerr cesarean section had been done after a test of labor of twelve hours' duration. Four years later, a repeat classical cesarean section was performed. She had had labor pains for sixteen hours prior to entry. Examination revealed strong uterine contractions. Soon after admission the uterus became boardlike. The patient complained of extreme abdominal pain. The pulse rose from 90 to 150. The fetal heart dropped to 60. There was no vaginal bleeding. An immediate laparotomy was performed and a 7 pound baby was extracted through a tear of the lower segment. This rupture was at the site of the previous Kerr scar. The classical scar was intact. The rupture extended into the posterior wall of the bladder. A supravaginal hysterectomy was performed. A suprapubic drain and a urethral catheter were placed in the bladder. One transfusion was given. The baby died

TABLE VI. LOCATION AND EXTENT OF THE RUPTURE

	COMPLETE RUPTURE	INCOMPLETE RUPTURE
Traumatic	11	6
Spontaneous	7	2
Lower segment	12	
Anterior wall (one Kerr cesarean)	8	
Posterior wall	2	
Lateral wall	2	
Fundus	6	
Classical cesarean scar	3	
Scar of previous rupture	1	
Posterior wall	1	
Pregnant horn	1	
Cervix into broad ligament		7
Fundus (cesarean scar)		1

of atelectasis four hours later. The mother had a temperature of 101° on the first day after operation. She had a satisfactory convalescence, however, and was discharged on the twenty-sixth day with the abdominal wound well healed and a normally functioning bladder.

There were 11 deaths, a mortality of 42.3 per cent. Death was due to shock and hemorrhage, or sepsis. All of the patients with rupture of a cesarean scar survived. The time interval between rupture and the institution of treatment, and the type of treatment are important factors influencing mortality.

TABLE VII. TREATMENT AND TIME INTERVAL AFTER RUPTURE

		LIVED	DIED
Traumatic Ruptures:		8	9
Hysterectomy	40 hours after rupture		1
Hysterectomy	28 hours after rupture		1
Hysterectomy within	4 hours of rupture	7	
Suture and laparotomy	3 hours after rupture	1	
Suture of cervix and vaginal vault			3
Unrecognized			2
Uterine tamponade			2
Spontaneous Ruptures:		7	2
Hysterectomy within	4 hours	4	
Hysterectomy after	12 hours	1	
Suture and laparotomy	3 hours after rupture	1	
Excision left cornua		1	
Hysterectomy	60 hours after rupture		1
Unrecognized			1

Transfusion combats blood loss and shock at the same time and should be used freely.

TABLE VIII. RECORD OF TRANSFUSION

NO. OF TRANSFUSIONS	LIVED	DIED
0	4	8
1	9	1 (Unrecognized rupture)
2	2	1 (Unrecognized rupture)
4		1

The outlook for the baby is distinctly bad. Only five were discharged well, a mortality of 82 per cent.

TABLE IX. CONDITION OF BABY AT BEGINNING OF DELIVERY IN TRAUMATIC RUPTURE

CONDITION	NUMBER
Dead	7
Poor	5
Good	3
Nonviable	2

CONCLUSIONS

1. Twenty-six cases of rupture of the uterus have been reported in 47,554 deliveries at the Boston Lying-In Hospital, an incidence of 1 in 1,829.

2. Sixty-five per cent of the ruptures resulted from the trauma of an operative delivery through the pelvis.

3. In 12 of 17 cases of traumatic rupture, internal podalic version was the ultimate type of delivery.

4. Five of 9 cases of spontaneous rupture followed previous cesarean section.

5. Multiparity is a prominent etiologic factor; only 2 in this series were primigravidas.

6. The maternal mortality was 42.3 per cent, fetal 82 per cent.

7. The treatment of choice is hysterectomy soon after the occurrence of rupture.

8. Transfusion markedly influences prognosis.

I desire to express my deep appreciation to Dr. Frederick C. Irving, Obstetrician-in-Chief of the Boston Lying-In Hospital, for the privilege of allowing me to undertake this study, and to Dr. John A. Sampson, Chief Gynecologist of the Albany Hospital, for much valuable criticism in the preparation of the paper.

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THE VASCULAR ASPECT OF ECLAMPSIA*

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THE search for the cause of eclampsia has inspired a multitude of theories which have spanned the entire range from mere conjectures to elaborate hypotheses and have produced a literature of vast extent. There have been few attempts, however, to approach the subject from the side of pathology. Rather have the theorists preferred to fit the manifestations of the disease into their preconceived notions of its etiology than to take as a point of departure the demonstrable changes produced in the human body, and to find therein a common factor for all the signs and symptoms. The identification of this common factor is the first step toward the solution of the problem, for its cause must also be the cause of the disease.

It is not my purpose to speculate concerning the cause of eclampsia but only to point out certain features of the morbid anatomy, some long familiar, others more recently brought to light, to indicate how they may be explained on a common pathologic basis, and to demonstrate, so far as is possible, how they may produce the familiar clinical signs and symptoms.

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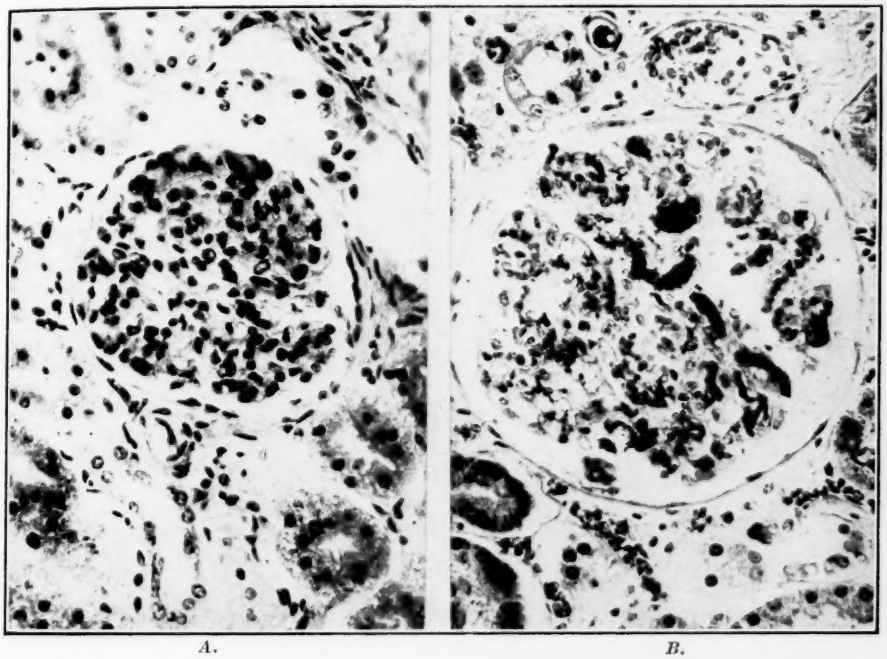
Of late years the conviction has grown that eclampsia and its precursor, preeclampsia, is not a disease primarily of the liver, or of the kidneys, or indeed of any individual organ, but an affection of all the small terminal arterioles. This concept was first advanced by Volhard[1] in 1918, and has been accepted by Hynemann,[2] Hinselmann,[3] and Fahr.[4] Moreover, the term, toxemia, is now regarded as of poor descriptive value since no toxin has been isolated in eclampsia, nor is the blood of eclamptic patients more poisonous than that of other pregnant women. The word toxemia has long been used to explain the manifestation of a disease the nature of which we did not understand.



A. *B.*

Fig. 1.—*A*, Glomerulus from normal kidney. *B*, Glomerulus from eclamptic kidney. Note in the eclamptic glomerulus the increased size, the ischemia and the presence of hyaline thrombi.

What evidence is there today that arteriolar derangement is the common factor in eclampsia? Pathologic changes bear witness and clinical investigations are constantly adding evidence. The organs most often and most actively affected are the kidneys. No case of ours which has come to autopsy has failed to show renal damage of a striking nature and consistent with our expectations, since most of the clinical manifestations of eclampsia indicate an immediate renal background.

As long ago as 1880 Cohnheim[5] suggested that albuminuria and oliguria might result from spasm of the renal arteries. It was not until 1924, however, that Fahr[4] published his classical description of the kidneys in this disease. He found an increase in size of the glomeruli due to swelling of the capillary walls, and a relative

absence of blood cells in the capillary lumina which produced a marked ischemia. Hyaline thrombi were found within the loops (Fig. 1). Weir, working in our pathologic laboratory, measured in microns the diameters of the glomeruli in 7 cases of eclampsia and compared them with the glomeruli of an equal number of normal kidneys. In each case 50 glomeruli were measured and the averages were taken. In 5 of 7 eclamptic patients the average was definitely greater than normal. In the remaining 2 cases one showed a slight decrease over the normal and the second a considerable decrease. Fahr considered these changes in the glomeruli to be due to spasm of the afferent arterioles and believed that they were accompanied by swelling of the vessel walls. The tubules exhibit albuminous degeneration which may advance to hyaline formation and fatty changes. Study of our specimens has in-

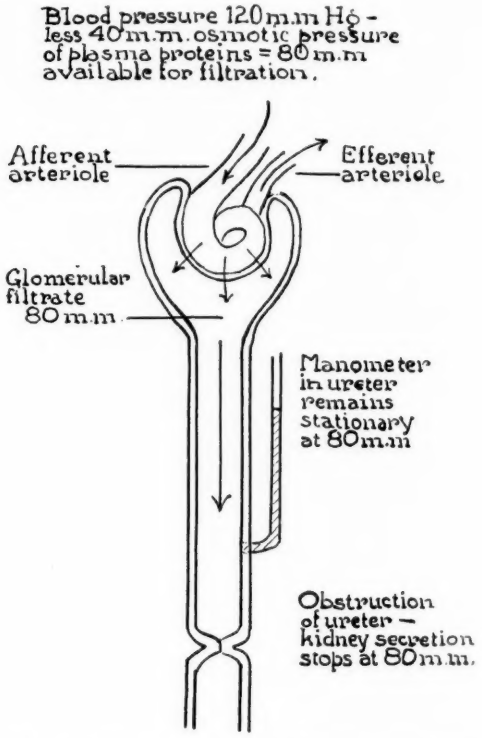


Fig. 2.—The hydrostatics of urinary secretion.

dicated that not all glomeruli are always equally involved, and that in some cases individual ones may escape entirely. In sections from such kidneys we have found injury only in the tubules draining the affected glomeruli. This may be explained on an anatomical basis, since an efferent arteriole, after leaving its glomerulus, plays a large part in the nutrition of the appended tubule. Spasm of the efferent arterioles therefore will impede the exit of blood by the afferent arteriole and so cause damage to the tubule. Further information regarding the nature of the glomerular changes was supplied by Bell,[6] who in 1932, by the use of the special azo-carmine stain, demonstrated a massive thickening of the capillary basement membrane.

What clinical findings in eclampsia may be explained by the changes in the kidney? Before discussing this question it will be profitable

briefly to review Cushny's[7] theory of urinary secretion, which at the present time is generally accepted as correct.

After the urine has passed through the capillary loops of the glomeruli into Bowman's capsules it becomes the glomerular filtrate and is identical in composition with the blood plasma except that it contains no protein. Albumin, therefore, is not a normal constituent of the glomerular filtrate. The glomerular filtrate is forced out of the glomerular loops under the direct head of the blood pressure which is about 120 mm. Hg. Opposed to this force is the osmotic pressure of the plasma proteins remaining within the blood stream and exerting another force in the opposite direction of 40 mm. Hg. The vailable pressure for secretion is thus 80 mm. Hg (Fig. 2). The glomerular filtrate, which amounts to the enormous amount of 100 liters daily, contains substances which are of use to the body and hence are completely or almost completely resorbed as they pass down the tubules (Fig. 3). These Cushny calls high

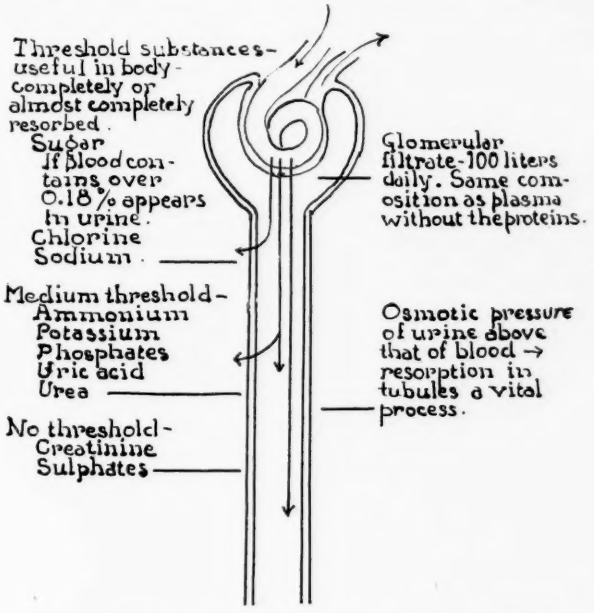


Fig. 3.—High, medium and low threshold substances.

threshold bodies and are sugar, chlorine, sodium, and bicarbonate. Sugar will be excreted if its concentration in the blood exceeds 0.18 per cent. This may be brought about if the patient is given intravenously over 2 gm. of glucose per kilo of body weight. An artificial diabetes is thus engendered, since water will pass into the glomerular filtrate to lower the increased osmotic pressure produced by the excreted sugar. This is the physiologic basis behind the intravenous use of concentrated glucose solutions to stimulate urinary secretion. Sodium, chlorine, and calcium are not completely resorbed in the tubules, but only in sufficient quantities to maintain a physiologic concentration in the blood. Ammonium, potassium, phosphates, uric acid, and urea are less completely resorbed, and are called medium threshold bodies. No threshold bodies are creatinine and sulphates, which are of no use to the individual and are completely eliminated. In grave kidney impairment creatinine is one of the last substances to accumulate in the blood. The amount of creatinine retained has some prognostic importance, since it is said that a concentration of over 5 mg. per 100 c.c. indicates recovery to be hopeless.

With these physiologic facts in mind we can turn our attention to the signs of preeclampsia and eclampsia which may be attributed directly and without question to faulty function of the kidneys. These are albuminuria, oliguria, hematuria, and tubular casts. Vascular spasm of the afferent vessels produces anoxemia of the walls of the glomerular loops, which results in their increased permeability, so that albumin is allowed to pass through. Experimental clamping of the renal artery will produce albuminuria when the constriction is released. The sudden onset of marked albuminuria which so often precedes or accompanies an eclamptic attack may be thus satisfactorily explained on the basis of an abrupt arteriolar spasm. With the relief of the attack

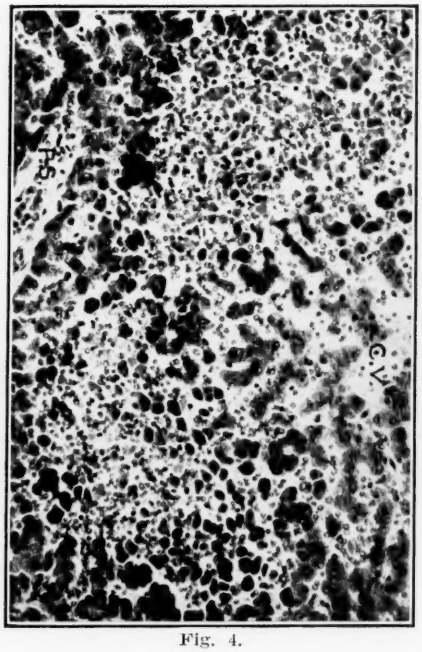


Fig. 4.

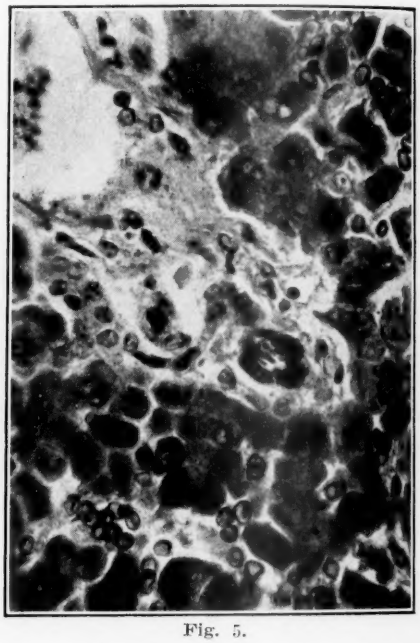


Fig. 5.

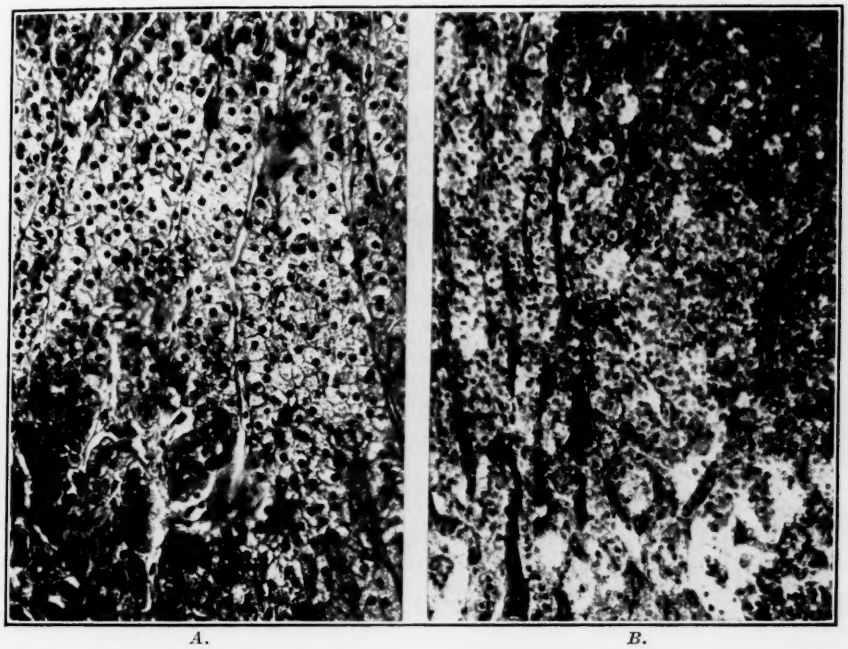
Fig. 4.—The liver in eclampsia. Note the midzonal hemorrhage and necrosis. *C. V.*, central vein; *P.S.*, portal space.

Fig. 5.—Thrombosis in a radicle of the hepatic artery in eclampsia.

the albumin disappears often with even greater rapidity, so that within twenty-four hours the urine may contain little more than the slightest possible trace. Oliguria is accounted for in the same way; the more severe the spasm the less the amount of urine which passes through the glomeruli. The same rapid return to the normal amount of excretion accompanies recovery as was the case with albuminuria. Casts are formed in the tubules. They result from the solidification of albuminous material in the absence of sufficient fluid to hold it in solution. Hematuria may result from stagnation of blood in the branches of the afferent

arterioles which supply the tubules and may rupture into them. Another possible cause may be bleeding into Bowman's capsule when the spasm of the afferent arterioles is released.

The liver has surrendered to the kidney the position of prime importance which it has occupied since 1893 when Schmorl[8] first described the lesions found in it at autopsy. His observations were corroborated by Lubarsch,[9] Konstantanovitch,[10] Ceelen,[11] and Fahr,[4] who in summarizing their findings stated that the characteristic lesions were found at the periphery of the lobule and consisted of fibrin thrombi in the capillaries, hemorrhage, and necrosis of the adjacent liver cells. This was accepted for some years as the typical picture of eclampsia.



A. *B.*

Fig. 6.—*A*, Cortex from normal adrenal. *B*, Cortex from eclamptic adrenal. Note hemorrhage, thrombosis of capillaries and destruction of normal architecture.

In 1931 Acosta-Sison[12] noted areas of hemorrhage, necrosis and fatty degeneration, usually predominant at the periphery of the lobule, but also found in the central and midzonal portion. In the same year Davidson[13] described necrosis in the peripheral, midzonal and central areas as well as focal lesions scattered throughout the lobules. The work of our pathologic laboratory fully confirms the finding of these two recent investigators. Fatty degeneration we have noted to be least common. We can say that the liver lesions of eclampsia may consist of hemorrhage, necrosis, or fatty degeneration, that they may occur in any portion of the lobules and that one, two, or all three varieties of lesions may exist in the same individual (Fig. 4). Thromboses of the radicles of the portal vein or of the small branches of the hepatic artery occupying the portal spaces may be found, thus placing the liver lesions also upon a vascular basis (Fig. 5).

Few of the signs or symptoms of eclampsia may be attributed to derangement of the liver. Probably the only one which can so qualify without question is jaundice, which is found only in cases of extreme severity.

Two other of the abdominal organs in our experience not infrequently exhibit vascular lesions. These are the adrenals and the spleen, both of which may be the seat of hemorrhages. In the adrenals the extravasation of blood occurs in the cortex and is accompanied in some instances by engorgement of the capillaries (Fig. 6).

The general peripheral circulation in the preeclamptic and eclamptic states shows evidences of arteriolar spasm.

Hinselmann[3] and Nevermann[14] observed the behavior of the capillaries at the base of the nail. They found that the loops were lengthened but that there was no tortuosity. There is thickening of the venous loop, stasis, and granular flow. Occasionally, due to vascular spasm, the arterial loop disappears to be followed by a like disappearance of the venous loop as if from the action of a peristaltic wave. Mylius,[15] using the Nordensen camera, showed in the retina the occurrence of spastic and tetanic vascular processes in 8 of 12 cases. Wagener[16] has made the first study of successive changes in the retinae of individuals with preeclampsia. The first visible sign was a narrowing of the arterioles accompanied or followed by hemorrhagic areas and cotton wool exudate and finally diffuse albuminuric retinitis. In his opinion the variability of the constriction represented a spastic process, which might pass into permanent sclerosis if the preeclamptic state were allowed to continue.

The usual sequela of preeclampsia or eclampsia is permanent vascular hypertension, or hyperpiesia, due in all likelihood to definite thickening of the arteriolar walls.

Corwin and Herrick,[17] in a study of 165 cases of the subacute or hypertensive toxemias of pregnancy, found that 74 per cent showed cardiac hypertrophy, sclerosis of the radial or brachial arteries and vascular eye changes from six months to six years postpartum and that one-third of these exhibited a persistent hypertension. Similar observations have been made by Peckham[18] and by Berman[19] and attributed, probably erroneously, to nephritis.

The special behavior of the blood pressure in preeclamptic and eclamptic patients must have attracted the attention of all who have observed many patients of this kind. The systolic pressure is extremely variable, being much higher on some occasions than on others in patients who are under constant observation. Moreover, we have noticed that blood pressure observations on both arms simultaneously not infrequently show a difference of as much as 20 mm. Hg, a phenomenon strongly suggestive of vascular spasm affecting at the same time different vessels unequally. Further evidence has been adduced by the unpublished work of Alexander in our clinic on the presence or absence of an artificially produced Duroziez's sign. Duroziez's sign is the familiar diastolic murmur which may be heard over the larger peripheral arteries in aortic regurgitation.

Blumgart and Ernstene[20] have shown that it may be elicited in normal subjects by immersing the arm in water at 114° F. and listening with a stethoscope over the brachial artery. The murmur should appear in five minutes. It may be obtained in practically 100 per cent of normal individuals under 40, and its presence signifies

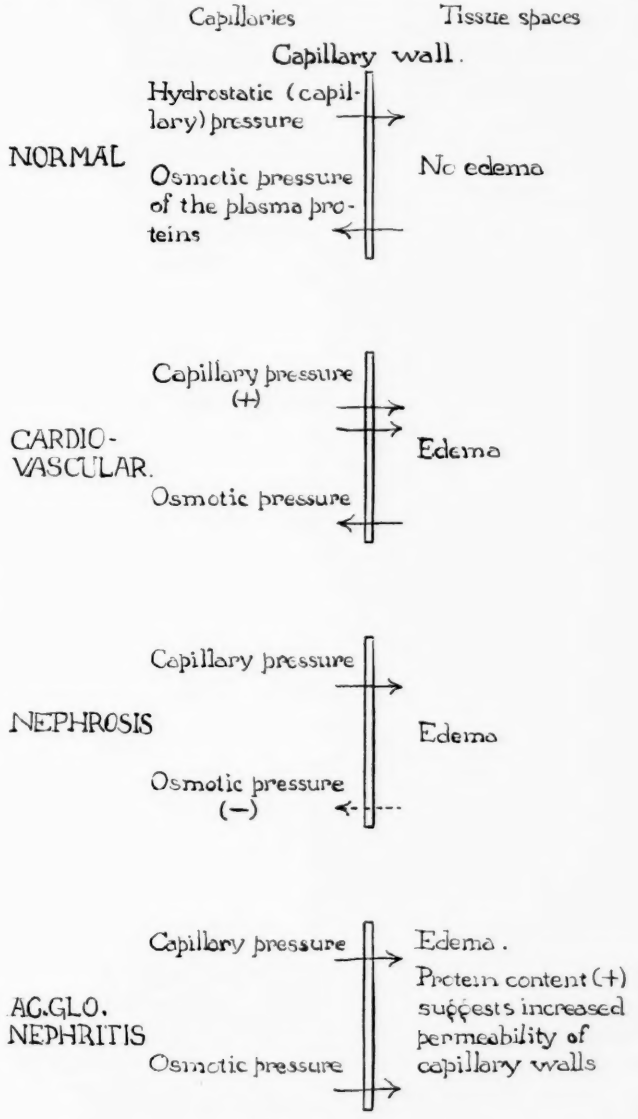


Fig. 7.—The production of edema.

the absence of arteriolar spasm or sclerosis. Alexander carried out this test to determine the arteriolar condition of 16 patients with present preeclampsia, or present or past preeclampsia or eclampsia, and found that 38 per cent failed to give Duroziez's sign, although all were in the age group where the normal expectancy of its appearance would be 100 per cent. Of 6 patients who had preeclampsia at the time and a past history of the same condition, 4 failed to give the sign. Of 7

patients who had preeclampsia for the first time, only 1 failed to manifest the phenomenon, thus indicating that the failure of Duroziez's sign is probably more indicative of arteriolar sclerosis than of arteriolar spasm.

The factors which determine the blood pressure are the output per minute of the heart, the force of the cardiac contraction, the viscosity of the blood, and the peripheral resistance. Since no evidence exists that these other factors are altered sufficiently to produce clinical manifestations, we may attribute the hypertension characteristic of the disease to an increase in the peripheral resistance, either in the kidney alone or in the general arteriolar system. In either event the elevation of blood pressure is apparently a protective mechanism, since it is an attempt on the part of the organism to maintain an adequate filtration pressure in the glomeruli.

The passage of fluid from the capillaries into the tissue spaces or in the opposite direction is regulated by the antagonistic action of the hydrostatic or capillary pressure which forces fluid out of the vessels, and the osmotic pressure of the plasma proteins which tends to hold it within (Fig. 7). According to Starling,[21] the permeability of the vessel walls may be increased by an impairment of their oxygen supply and edema may so result. Such an anoxemia may be caused by arteriolar spasm. In this case the passage of fluid outward may be slightly aided by the somewhat diminished plasma proteins found in preeclampsia and eclampsia. In acute glomerular nephritis the protein content of the edema fluid is greater than that of the blood, which is suggestive of damage to the capillary walls. No such studies have been conducted on the edema fluid in eclampsia. If made, they might be productive of considerable information regarding the mechanism of this important manifestation.

The pathologic examination of the brain in eclampsia shows a variety of lesions.

Braunmühl[22] found ischemic cell disease which he believed due to vasoconstriction. Jaffé[23] considers that vascular spasm may cause necrosis of the vessel wall, followed on the relief of constriction by vascular rupture due to the sudden access of blood. Benoit[24] and de Vries[25] also attribute the character of the changes to primary spasm of the cerebral arteries and arterioles. Rowntree[26] has shown that if water in larger amounts is given to experimental animals, vomiting, convulsions, and coma are produced. This observation may have some bearing on the etiology of convulsions, since the presence of excessive edema added to the artriolar spasm may be a factor in their production.

If we accept the hypothesis that arteriolar spasm is the common factor in eclampsia, the next question concerns the cause of this phenomenon. Constriction and dilatation of the blood vessels is controlled by the vasomotor center, which is situated in the floor of the fourth ventricle at the level of the calamus scriptorius. Any substance which will

stimulate the vasoconstrictor fibers may be expected to cause contraction of the terminal arterioles. No such substance has been identified in eclampsia.

The same effect might be produced by the direct action of some substance, such as pituitary extract, upon the vessel walls.

In 1931 Anselmino and Hoffmann[27] prepared an ultrafiltrate from the blood of eclamptic and preeclamptic women and injected it into rabbits with known diuresis curves. They found that it would cause anuria, retention of chlorides, and an elevation of blood pressure, while an ultrafiltrate prepared in the same way from the blood of normal pregnant women would produce no such effect. Similar results could be obtained by the injection of pituitary extract. Moreover, Anselmino and Hoffmann stated that their ultrafiltrate resembled pituitary extract, in that it was rendered inert by exposure to ultraviolet light and alkalinization and was absorbed by talcum. They reasoned that the toxic agent in eclampsia might be pituitary extract, since it produced evidences similar to their material obtained from women suffering from the disease. Unfortunately, the findings of Anselmino and Hoffmann have not been confirmed by other investigators. Hurwitz and Bullock,[28] in our clinic, have repeated the experiments and have obtained entirely negative results with the ultrafiltrate. The results with pituitary extract, already well known to physiologists and pharmacologists, can, of course, be duplicated with ease.

Certain general conclusions may be drawn from a study of the pathology and pathologic physiology in preeclampsia and eclampsia.

1. There is considerable evidence that the disease is vascular in nature and may best be explained on the basis of arteriolar spasm.

2. Hypertension is probably a protective mechanism. Any measures which are directed solely toward a reduction of blood pressure are productive of little benefit.

3. Edema may cause considerable harm and active steps should be taken to bring about its removal. Free watery catharsis, produced by large oral doses of magnesium sulphate, is an effective method of reducing anasarca. Diuretics acting directly on the glomerular endo- and epithelium are contraindicated, since on account of the nature of the kidney lesion they cannot be employed on a rational basis. The intravenous use of concentrated glucose solution is sometimes useful in stimulating kidney secretion when recovery is under way, but it is often of little benefit in the presence of complete, or almost complete, urinary suppression.

4. The best treatment for eclampsia is prophylaxis. For this reason each case of preeclampsia should be carefully studied from the aspect of abnormal physiology and delivery effected when improvement under treatment fails to take place.

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THE INJECTION TREATMENT OF VARICOSE VEINS IN PREGNANCY*

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In 1579 Ambroise Paré voiced his objection to the treatment of varicose veins in pregnancy: "Women with child are commonly troubled with them by reason of heaping together of their suppressed menstrual evacuation. It is best not to meddle with such as inveterate for of such being cured there is to be feared a reflux of the melancholy blood to the noble parts, whence there may be danger of maligne ulcer, a cancer, maddness or suffocation."

In the past six or eight years there has been an increasingly general acceptance of the safety and satisfactoriness of the treatment of varicose veins by injection in the nonpregnant. Yet Paré's idea concerning the treatment of varicose veins in pregnancy has not changed much. Even as late as 1929, Douthwaite, and in 1932 Maingot, noted pregnancy as a contraindication to the injection treatment. Jacques Forestier in 1928 joined in this objection, basing his opinion on the assumption that the varices accompanying pregnancy are due to transitory troubles of the endocrine glands, which disappear after delivery. E. T. Payne, likewise, objects to the injection treatment of varicose veins in pregnancy, but is willing to make exception in patients in whom the veins are giving rise to severe discomfort.

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*This constitutes a preliminary report only; to September 15, 1935, 1,775 injections have been given to 344 patients; a complete analysis of the work in this special clinic is in preparation.

Thesis submitted to the Faculty of Gynecology-Obstetrics of the Graduate School of Medicine of the University of Pennsylvania in partial fulfillment of the requirements for the degree of Master of Medical Science (M.Sc. [Med.]) for graduate work in Gynecology-Obstetrics.

In 1929 McPheeters expressed his opinion in favor of injection treatment and in 1931 reported 46 cases successfully treated. He considers varices of pregnancy, when they are painful or distressing due to large size, as particularly suitable for injection. It is true that most of these patients will have their condition relieved partially or completely following confinement. But he asks whether it is logical to expect a woman to suffer from three to five months with a condition which can be relieved with so little difficulty and at such comparatively slight risk. He arbitrarily chooses the sixth month as the latest limit for the treatment.

Noble, of Vienna, believes that obliteration treatment of varicose veins may be resorted to in the first half of pregnancy, but should be avoided in the second half, not only because of extreme dilatation of the vessels, but also because of hormonic changes in the coagulability of the blood. In our series the treatment was not restricted in relation to the duration of gestation, and the greater number of our patients were treated after the sixth month.

The question of etiology of varicose veins in pregnancy is not as yet definitely settled. There are numerous theories offered by different investigators, none of which appear wholly acceptable. There always was a notion among obstetricians that the varicosities are caused by the pressure of the enlarged uterus on the external iliac veins, thus causing obstruction to the venous flow. Lohr and Kownatski believed that the varicosities are not due to the increasing size of the uterus and pressure by it on the veins, but to the dilatation of genital collecting veins and as a result a great increase in the compensatory back pressure in the external iliac and saphenous veins. This theory explains very well the varicosities of the latter months of pregnancy but not of the early ones. For certainly in the second and third months of pregnancy there is not a great increase in the blood volume and the size of the uterus and yet in many instances the varicosities are already pronounced at that early period of gestation.

Generalized loss of tonicity of the smooth muscles during pregnancy offers some physiologic explanation for this phenomenon. The investigation of Gellhorn and Alvarez fully support this theory. Evidence of the close relationship of the endocrine system to the development of varicose veins in pregnancy is presented by a number of investigators. Forestier firmly believes that the insufficiency of the posterior pituitary secretion is responsible. Professor Sickard considers three endocrine and ovarian periods in a woman's life: first, prepubertal; second, from puberty to menopause; and third, the rest of her life. The interruption of her endocrine balance by pregnancy may influence the formation of varices. But if Sickard's theory is correct, asks McPheeters, why should we not have rapidly developing and extensive cases of varicose veins following hysterectomies and ovariectomies, conditions which seldom actu-

ally occur. Numerous attempts to treat varicosities by administration of endocrine gland preparations have been made, but so far no definite results have been obtained.

One of the most important objections offered against the injection treatment of varices is the possibility of embolus formation. Yet fluoroscopic examination of the veins after injection of lipiodol as opaque medium by Magnus, Sickard and McPheeters has definitely established the fact that the flow of blood in the varicose veins is downward toward the feet. The fact largely precludes the possibility of embolus formation because the tendency is to force the thrombus downward instead of aspirating it toward the heart.

The other most important objections are the possibility of extension of the thrombus formed after the injection and development of acute infectious thrombophlebitis. From the experience of many surgeons it has been definitely found that the thrombus formed by the injection treatment has no tendency to extend as often happens in infectious thrombus, and the occurrence of acute thrombophlebitis is encountered actually less frequently in patients treated by the injection method than in those not so treated.

In our group of 100 patients only one developed aseptic thrombophlebitis following the injection, which was not accompanied by rise in temperature and subsided shortly without producing any untoward effect. On the other hand, three patients were observed by us in the hospital with acute thrombophlebitis following delivery, all of whom had suffered from marked varicosities and refused treatment previous to confinement. In the entire group of treated patients there was no thrombophlebitis observed before, during, or after delivery, except the one aseptic reaction noted above.

Anatomic observations have shown that the process called "venitis" by Sickard and Forestier, caused by chemical irritation of the veins, is entirely different from the infectious process or phlebitis. Venitis is a localized process with formation of very adherent clot, but with no general reaction such as pain or edema, and the final result is the formation of an atrophied cord. In phlebitis there is edema, the clot is loose, and atrophy does not take place. As a result embolism is very probable, while in venitis it is very rare. If embolism should occur, and could be attributed to the sclerosing solution solely, it would happen shortly after injection.

TECHNIC

In establishing diagnosis in our group of patients at the Margaret Hague Maternity Hospital, it was found almost unnecessary to subject them to the Trendelenburg test as the condition was self-evident. The only test we used was the application of a linen mesh bandage which the patient was instructed to use for one week previous to the injection treatment, removing it at night and reapplying it on arising. This simple measure not only made the patient more comfortable but also enabled us to

recognize that the deep system was functioning properly, and that we were dealing with true varicose veins and not with the compensatory varicosities necessary to maintain venous return.

The technic of injection was simplified to the utmost. All injections were done with the patient standing on a broad table, the height of an ordinary chair. The skin was cleaned with alcohol, as colored antiseptics mask the veins. We used 10 c.c. glass Luer syringes and 21 gauge intravenous needles with medium bevel, 1½ inch long, sterilized by boiling.

The needle should traverse first skin and connective tissue, before entering the vein. Taking this precaution a valve puncture may be obtained and the possibility of back flow extravasation of the solution reduced to the minimum. Of course, the operator should be absolutely certain that the needle is actually within the lumen of the vein and that free flow of blood appears in the syringe on withdrawing the plunger. Further, it is well to withdraw a little blood before removing the needle as it is drawn out through the tissue.

The purpose of the injection treatment is to bring the injected fluid, in as concentrated a solution as possible, into direct intimate contact with the endothelial lining of the vein. The more concentrated the solution the more destructive action it will have on the lining of the vein. In our experience the tourniquet was not necessary and was omitted altogether. The sclerosing action of the solution could be in most instances demonstrated almost immediately after the injection.

The only precaution taken after the injection was strapping by adhesive plaster with a sponge folded over the injected area. The pressure was used only for the purpose of avoiding the leakage of the highly sclerosing irritating solution. Even small amounts of the solution deposited outside the vein will invariably result in severe perivenitis and oftentimes slough.

After the injection the patient is encouraged to walk about the room, is advised against bed rest, and is urged to continue her everyday occupation and housework.

Normally almost every patient experiences cramping pain; the cramp is evidently due to the irritation of nerves in the adventitia, when the injected sclerosing solution reaches them through the wall of the vein or through capillaries.

Occasionally, even with the best of technic, the patient may move and as a result some of the solution will be deposited outside the vein. As a result the patient will immediately experience a burning sensation. In some instances we have noted that soon whitish discoloration of the skin was produced at the site of the injection. Injection should be stopped and corrective measures taken. In our experience normal salt solution injected promptly into the subcutaneous tissue around the vein in the amount of 5 to 10 c.c. neutralized the destructive action of the sclerosing solution and prevented severe reaction.

In our group of one hundred patients with a total number of 473 injections, perivenitis was encountered in only four instances, and slough resulted in only two cases.

We used almost exclusively a solution of dextrose, 50 per cent, and sodium chloride, 30 per cent, because we feared the severe reactions which may result from sodium morrhuate. Ritchie mentions three different types of such reactions:

1. Gastrointestinal disturbances with abdominal pain and diarrhea shortly after the injection.
2. Erythematous manifestations of the skin.
3. Collapse with cyanosis, pallor, low blood pressure and temporary loss of consciousness.

All of these complications, of course, would be particularly undesirable and dangerous in the pregnant individual.

The use of preparations of quinine might represent some danger in pregnancy, though in the tropics large doses of quinine are used without any untoward effect, and Greene reported a series of 25 pregnant women who were very successfully treated with quinine urethan.

In treating slough we found that simple strapping with heated adhesive plaster in narrow straps overlapping one another, but not encircling the limb altogether, shortened the healing process considerably, and what is more important, completely relieved the patients from pain and discomfort. Otherwise, the treatment of slough is purely surgical.

As far as contraindications are concerned it seems there are only cardiorenal decompensation and infectious thrombophlebitis, both requiring more or less complete rest in bed. This does not comport with the injection treatment as here it is essential to keep the patient up and about even in case of developed complications, as perivenitis, so as to prevent the remote possibility of embolism by aspiration from the great saphenous system.

The following tables represent our group of 100 patients treated with the injection of dextrose and sodium chloride solutions:

Past history of duration of varicose veins:

1 month	6 patients	1 year	2 patients	9 years	2 patients
2 months	8 patients	2 years	14 patients	10 years	6 patients
3 months	9 patients	3 years	8 patients	11 years	1 patient
4 months	1 patient	4 years	7 patients	12 years	3 patients
5 months	4 patients	5 years	8 patients	13 years	1 patient
6 months	5 patients	6 years	2 patients	15 years	1 patient
7 months	3 patients	7 years	2 patients	19 years	2 patients
		8 years	4 patients	20 years	1 patient

The months of gestation at which time the treatment was instituted were:

Third month	5 patients
Fourth month	5 patients
Fifth month	21 patients
Sixth month	25 patients
Seventh month	27 patients
Eighth month	15 patients
Ninth month	2 patients
Total	100 patients

As to the number of pregnancies the patients in our group were divided as follows:

Gravida 1	3
Gravida 2	23
Gravida 3	31
Gravida 4	16
Gravida 5	11
Gravida 6	7
Gravida 7	2
Gravida 8	2
Gravida 9	4
Gravida 11	1
Total	100

Location of varicosities:

Leg	96
Thigh	55

Symptoms:

Pain	81
Cramp	76
Swelling	70
Excessive tire	81
Heaviness and others	44

Degree of severity, etc:

Mild	29
Moderate	56
Severe	15
Ulcer	4
Phlebitis	2
Varices of vulva	11

Treatment:

Reaction		*Results*	
No reaction	95	Good	90
Perivenitis	4	Improved	10
Aseptic phlebitis	1		
Slough	2		

The duration of varicose veins during current pregnancies was:

1 month's duration	10 patients
2 months' duration	14 patients
3 months' duration	13 patients
4 months' duration	28 patients
5 months' duration	13 patients
6 months' duration	15 patients
7 months' duration	7 patients
Total	100 patients

The number of injections given to patients:

1 injection was given to	20 patients
2 injections were given to	15 patients
3 injections were given to	13 patients
4 injections were given to	11 patients
5 injections were given to	9 patients
6 injections were given to	8 patients
7 injections were given to	4 patients
8 injections were given to	5 patients
9 injections were given to	4 patients
10 injections were given to	2 patients
11 injections were given to	2 patients
12 injections were given to	1 patient
13 injections were given to	1 patient
14 injections were given to	3 patients
15 injections were given to	1 patient
17 injections were given to	1 patient
473 injections were given to	100 patients

As is seen from the last table, some of the patients received quite a number of injections. That was entirely due to the extensive varicosities and to the fact that only one injection at a time was given. This precaution was taken as from the experience of other surgeons; excessive chemical perivenitis was encountered following injection in patients with extensive varicosities, when too large an area was treated at one time. On an average two injections a week were given.

CONCLUSIONS

1. Relief of pain and discomfort was obtained by an easy and comparatively harmless procedure.

2. This contributed to the prevention of thrombophlebitis after delivery by eliminating stagnation of blood stream in patent vessels which evidently predisposes to this complication.

3. Great appreciation in general was shown by the patients. Many declared that prior to the injections they had been hardly able to get about and later they were able to do their household duties with comfort.

4. During pregnancy the veins are usually prominent and easily treated; although they usually decrease in size and prominence after pregnancy, they certainly have a tendency to reappear during later pregnancies. This liability is lessened by such treatment.

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Saito found that in Japanese women menstruation returned in 72 per cent of lactating women. Bleeding returned within three months in 29.4 per cent, whereas between four and twelve months it returned in 55.9 per cent. According to the reports concerning European and American women, menstruation reappears within three months after delivery in about 33 per cent of all cases. In Japan, however, the average figures are 18 per cent within the first two months after delivery and 26 per cent within the first three months. With the prolongation of lactation, the menses have a tendency to be delayed. The average interval was 3.7 months. Patients with a small amount of milk in the breasts had an earlier recurrence of the menses.

J. P. Greenhill.

THE HEART IN UTERINE MYOMA

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THE present study was undertaken to determine, if possible, whether uterine fibroids produced any definite and demonstrable effect upon the cardiovascular system.

HISTORICAL

A generation or so ago, the effect was supposed to be definitely toxic; later, the cardiac changes were called "functional," and any causal relationship between cardiac degeneration and uterine fibroids was denied. More recently, the pendulum seems to be swinging back to the original idea of toxic absorption and cardiac damage.

Thus, Bandler[2] found organic myocardial or functional cardiac changes in 30 to 40 per cent of his cases and claimed further that fibroids "cause changes in the liver and kidneys through blood loss, pressure effects and intoxication." Penrose, in 1908, wrote, "The effect of tumors of large size upon the heart and blood vessels has been remarked by several writers. Fatty degeneration and brown atrophy have been found associated with uterine fibroids in a number of instances. This is undoubtedly the explanation of some cases of death after operation."

Martin has called attention to the disposition to thrombosis and embolism which seems to be especially marked in the telangiectatic form of tumor. This also explains some of the cases of sudden death that occur after operation. Operators have observed cases of sudden death, probably from embolism, occurring sometimes several weeks after hysterectomy for fibroid tumor.

Other writers are not so insistent upon the causal relation between the uterine growth and cardiac defect. Dudley[7] and later Cameron[5] say hardly a word about any cardiac damage in their discussion of uterine fibroids, whereas, Bell[3] states that "sometimes the heart and blood vessels undergo considerable degeneration of the muscular tissue."

As to the cause of the degeneration, there is no unanimity of opinion. The older writers spoke of the "toxic effect" of the myoma. Some even theorized an actual substance not unlike that produced by toxic adenomas of the thyroid gland. In more recent years, however, less credit is given to theories which emphasize the toxic effects.

Kelly and Cullen[13] in studying about 1,000 cases of uterine myomas found cardiac impairment in only about 10 per cent of the patients. Most of the murmurs they regarded as functional. Their "experience coincides with the view expressed by Leopold that the cardiac changes are usually functional and are a direct result of the anemia caused by the uterine hemorrhage."

Other evidences of cardiac insufficiency have been pointed out by Polak,[15] Bland,[4] Anspach,[1] and others. They note palpitation, increase in pulse rate and dyspnea, besides murmurs at the various valves. The latter they ascribe to anemia or to dilatation of the chambers of the heart.

Graves,[10] however, seems to favor the toxin theory. He states that the "general tendency is to ignore causal relation except in long-standing cases with anemia."

Certain vasomotor symptoms are sometimes observed in women who have fibroids, such as tremors, hot flushes, dizziness, and tachycardia, which have seemed to substantiate the claim for a toxic influence in fibroid tumors. These symptoms are, however, frequent in women without fibroids. "Notwithstanding the present trend to disassociate myomas from heart lesions, and to discard the toxic theory of uncomplicated fibroids, it is well to reserve judgment until the facts are better established. The profound effect which fibroids without local symptoms often have upon the organism of women, and especially on her nervous system, certainly suggest that the older theories may not be without basis."

And Arthur H. Curtis[6] states, "my personal reaction is that the heart muscle tends to develop degenerative changes due to systematic absorption of toxic waste products which accumulate in the depths of the tumors, notably in those with poor circulation and degenerative changes." This view is shared by Shedden[16] who feels there is "at least a suspicion of tumor intoxication."

ANALYSIS OF MATERIAL

Thirty consecutive patients with proved fibroids were studied both clinically and electrocardiographically. In contrast with this group, thirty other patients were chosen from different surgical services, who were operated upon for various pelvic conditions other than fibromyoma of the uterus.

In the fibroid group it was found that 13 (43.3 per cent) presented no cardiac symptoms, 9 (30 per cent) had symptoms of slight cardiac embarrassment, chiefly dyspnea on exertion, while 8 (26.7 per cent) complained of moderate to marked cardiac insufficiency, characterized by dyspnea, palpitation, precordial pain, dizziness, and ankle edema.

The electrocardiograms of these 30 patients showed 15 normal tracings, 3 had left predominance, 9 showed evidence of questionable or definite myocardial degeneration, and 3 had evidence of coronary disease. Of the 9 patients who showed mild or moderate cardiac degeneration, 2 had nephritis with hypertension; 2 had nephritis without hypertension; 1 had advanced nephritis with pulmonary tuberculosis. Thus 5 patients had definite lesions which may have accounted for the cardiac damage.

The electrocardiograms of the nonfibroid cases showed the following: 15 were normal; 7 had left predominance; 7 showed definite myocardial degeneration; while 1 had coronary sclerosis.

It will be seen from Tables I and II, that in one-half the cases there was demonstrable neither clinical nor electrocardiographic evidence of cardiac disease. In the

TABLE I. CLINICAL SYMPTOMS IN 30 FIBROID CASES

No cardiac symptoms	13
Slight symptoms (exertion dyspnea)	9
Moderate symptoms (dyspnea, ankle edema, precordial pain, and palpitation)	8

TABLE II. ELECTROCARDIOGRAMS IN 30 FIBROID CASES

Normal	15	50%
Left axis deviation	3	10%
Questionable evidence of myocardial damage*	3	10%
Definite evidence of myocardial damage*	6	20%
Aberration of S-T interval (Coronary disease?)	3	10%

*Low or flat T waves and/or splintering of QRS complexes; low amplitude QRS.

remaining 50 per cent, changes in the cardiovascular system were present in varying degrees, as evidenced by the history, physical examination, and electrocardiogram.

Clinically the 9 patients, whose electrocardiograms showed questionable or definite myocardial degeneration, had the following impairments: 2 had hypertension with nephritis; 2 had mild nephritis without hypertension; 1 had advanced nephritis and pulmonary tuberculosis.

END-RESULTS

Of the 30 cases, 3 were not operated upon. One died twenty days after admission following a transfusion; 1 refused operation, and, in 1 case, operation was not advised because of an associated tuberculosis and nephritis.

Of the 27 operated upon, 2 (7.4 per cent) died. One died five days postoperatively from paralytic ileus. Although this patient had mitral regurgitation and electrocardiogram changes indicating myocardial damage, there is a reasonable assumption that these did not predispose to her demise. The other patient died six days after operation from a low-grade peritonitis. This patient had no cardiac symptoms and the electrocardiogram was normal.

The other patients made uneventful recoveries.

The contrasting nonfibroid group of patients showed the following results in the electrocardiograms (Table III).

TABLE III. ELECTROCARDIOGRAMS IN GROUP OF NONFIBROID PATIENTS

Normal	15	50%
Left axis deviation	7	23%
Definite myocardial degeneration	7	23%
Coronary sclerosis	1	3%

It will be seen from Tables I and II, as already stated, that, in one-half of the cases, there was demonstrable neither clinical nor electrocardiographic evidence of cardiac disease. In the remaining 50 per cent, changes in the cardiovascular system were present in varying degrees, as evidenced by the history, physical examination, and electrocardiogram. Let us analyze these findings and see whether the association is merely accidental or real.

Certain facts must be evaluated to enable us to give the proper amount of weight to the findings.

Age.—The average age of the group of fibroid cases was forty-one years; the youngest being twenty-three, the oldest sixty-one. Of those who complained of cardiac symptoms, however mild, the average age was forty-two.

This is the age at which degenerative changes come to the foreground, even in otherwise normal persons. It is of great significance that the nonfibroid cases showed an average age almost exactly that of the myoma group, viz. 40.8 years, and the electrocardiographic findings were quite comparable (see Table III).

Anemia.—Many authors have felt that some, at least, of the degenerative heart changes were due to impoverishment of the blood. There is no denying the fact that anemia will in time produce changes in various organs, to which the heart is no exception. Some gynecologists have taken the arbitrary stand of not operating upon patients whose hemoglobin is below 40 per cent. In this series, the range was from 100 per cent down to 35 per cent. The patient whose hemoglobin was 35 per

cent succumbed after operation, the cause of death being a low grade peritonitis and mesenteric thrombosis. Two transfusions had been given prior to operation, and the immediate postoperative course was good.

Endocrine Changes.—We have pointed out that the average age of these patients was forty-one years. This, in our climate, corresponds in most cases practically to the onset of the menopausal syndrome. At this time of life, signs and symptoms of myocardial fatigue and insufficiency frequently begin to make themselves manifest.

It is at this time also that other degenerative diseases usually begin to appear, including nephritis, arteriosclerosis, and its frequent concomitant hypertension. It is worthy of note that 8 patients in this series had an elevated blood pressure, varying from 10 to 35 points above the normal for the age.

COMMENT

Critical analysis of the material would seem to lead to the conclusion that uterine myomas do not produce any significant changes on the cardiovascular apparatus.

Comparison with an equal number of patients of the same age groups admitted to the surgical service on account of pelvic disorders showed, on clinical and laboratory examination, a surprising similarity of symptoms and signs. That the cardiac damage evident in the patients with the myomas was not due to their presence is suggested by the concomitant association of other exciting disease and is further strengthened by finding similar impairments in the nonfibroid group.

It is significant that no patient died of any cardiac complication despite the presence of coronary artery disease in three and other definite myocardial damage as noted above.

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1723 PINE STREET

ABSCESS OF THE OVARY*

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THIS presentation consists of a study of 105 suppurating ovaries, 80 of which occurred in the Gynecological Service of the Memphis General Hospital, and 25 in the Baptist Hospital, from November, 1932, to May, 1935. A previous report of 105 cases (South. M. J. 26: 630, 1933) is not incorporated in this report. Eighty suppurative ovaries occurred in 1,366 operative cases of pelvic inflammatory disease, an incidence of 6 per cent. Twenty-five cases were present in 696 cases of pelvic inflammatory disease requiring surgery, an incidence of 3.06 per cent.

The frequency of occurrence of ovarian suppurations has been noted apparently by two other observers. Chomé found 15.45 per cent of ovarian suppurations in 110 cases of salpingitis in the Clinique Tarnier. Darnall stated that he found 12.4 per cent of ovarian suppurations in 9,872 laparotomies for pelvic infections at the Atlantic City Hospital.

In my previous report suppurations of the ovary occurred in 7.01 per cent (corrected percentage) of operative pelvic infections. A conservative estimate is that approximately 6 per cent of operative pelvic inflammatory disease will have a suppuration of the ovary. If the clinical, instead of the pathologic, diagnosis is accepted as the final diagnosis, the percentage will be much higher.

The clinical course and laboratory findings are quite different in the presence of a suppurating ovary from the usual pelvic infection. Therefore, an attempt at a differential diagnosis of pelvic inflammatory pathology should be made. One will find a difference in the etiology, bacteriology, pathology, and clinical findings in a tubo-ovarian abscess from that found in a pyo-ovarium. By a careful study of the etiology, symptomatology, and the physical findings, a preoperative diagnosis may at times be made between these lesions. I am convinced that the neisserian organism is responsible in nearly 100 per cent of tubo-ovarian abscesses. A tubercular tubo-ovarian abscess is an exception. None of this group was tuberculous and only one of the previously reported 105 cases was tuberculous. The frequent occurrence of gonorrheal pelvic infection causes the tubo-ovarian suppurations far to exceed the number of pyo-ovariums. It is possible that pyo-ovarium may be due to the gonococcus, yet the tubes remain free and do not enter into the suppurative cavity.

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The ovary is practically an isolated organ, yet is subjected to various types of bacterial invasion. The corpus luteum offers a favorable medium for the growth of organisms.

Pozzi, and others, correctly taught that a follicular cyst or a yellow body favored infection and all abscesses were thought to be luteinic in character.

Excellent contributions on pyo-ovarium have been made by French, German, Spanish, and Italian writers; prominent among them may be mentioned the names of Fry, Manges, Doleris, Wertheim, Langer, Watjen, and others, who described the anatomy of the luteinic abscess. Lampert, Ziegler, and Cohen described the tuberculous abscess. Orthmann and Pfannenstiel contributed to the pathology of pyo-ovarium. Ohman, in 1913, operated seven days after a normal delivery upon a woman, who presented acute pelvic symptoms with a mass to one side, which proved to be a streptococcic pyo-ovarium. Chomé, in 1919, described the anatomy and histology of a luteinic abscess, with its limiting luteinic membrane, and claimed that all ovarian suppurations were luteinic. R. Meyer and Aschoff contradicted the luteinic theory as being responsible in all cases. Tenani, in 1923, reported the rupture of a pyo-ovarium during the second stage of labor, which was followed by a streptococcic peritonitis and death. Rudolph and Keck, in 1924, reported a suppurative ovarian cyst due to the paratyphoid bacillus. Kriwski, Windesch, Bland-Sutton, Hurst, Wiener, and others have reported finding a suppuration of an ovarian cyst due to the typhoid bacillus. McKinney, Stewart and McClure, in 1934, reported a suppurative ovary following mumps.

The available English literature is meager upon the subject of the pyo-ovarium or the tubo-ovarian abscess as a separate pathologic entity. After observing for several years the difference in the behavior of the two conditions from the usual pelvic infections, I have been prompted to make the present report.

The mode of infection of the ovary when due to the gonococcus follows the path of the tube. If a recent dehiscence of the graafian follicle has occurred, appropriate opportunity is afforded for the growth of the gonococcus. The fimbrias become sealed around the corpus luteum closing off the pelvic cavity from further infection but continues its destructive effects upon the ovary. The pus in such a case usually becomes sterile and the laboratory findings, as well as the clinical picture, are not so severe as in a pyo-ovarium, unless secondarily infected. If a co-existing infection is present, it progresses in a similar manner as the pyo-ovarium. While the staphylococcus, colon, or other bacteria may be present, 95 per cent of pyo-ovariums are due to the streptococcus. Infection in pyo-ovarium may be via the hematogenous route, e.g., from variola, parotitis, typhoid, influenza, etc., or by contiguity of tissue from other infected organs.

REPORT OF CASES

CASE 1.—J. S., married, para ii, aged twenty-eight years, colored. Ill for several months. Entered the Memphis General Hospital, June 13, 1934, complaining of pain in the left side, leucorrhea, and amenorrhea for nine months. Preoperative days in hospital, forty-two. Pyorrhea and bad tonsils were the only infections

found. Urine and Kahn negative. Temperature became normal several days before operating. Hemoglobin, 66 per cent, R.B.C., 3,000,000; sedimentation time (July 26, 1934), eleven minutes; Aug. 12, 1934, thirty minutes. Operation revealed a left pyo-ovarium the size of an orange. Left tube normal. A right salpingo-oophorectomy was performed several years previous to her present trouble. Rupture occurred during removal of pyo-ovarium and the patient succumbed on the ninth day, from peritonitis. From multiple abscesses present were grown the streptococcus and staphylococcus. Infection from the mouth via the circulation was the only logical etiology. If a suppurative ruptured appendix occurs during a recent ruptured follicle, infection of the ovary may occur.

CASE 2.—Mrs. M., aged fifty, para v, one miscarriage. Entered the Baptist Hospital, Aug. 7, 1934, complaining of severe lower right-sided abdominal pain, vomiting, and cramping. Three months previously she had an attack of appendicitis, but was not operated upon. Did not convalesce from the appendicitis and her symptoms became worse several days before entering the hospital. A diagnosis of an ovarian abscess was made from her history, physical findings, and laboratory tests. Wassermann was negative. After a few days the white count dropped from 16,150 to 7,600, but the sedimentation time only dropped from thirteen to twenty-two minutes. Temperature was normal several days preoperatively. At operation the appendix was found to be communicating with a right pyo-ovarium. Left appendages were normal. Culture from pus was positive *Streptococcus hemolyticus*. The ovarian abscess evidently resulted from her appendicitis. Patient recovered.

In pelvic cellulitis, diverticulitis, pelvic peritonitis, or appendicitis, the ovary may become infected as in the above case by contiguity of tissue. Pyo-ovarium as a complication of an infected fibromyoma, carcinoma of the uterus, septic endometritis, or following puerperal or postabortive infections, the route of infection is by contiguity of tissue.

The teaching of Championniere, that infection of the ovary occurs through the lymphatics from the uterus, has been disproved by the investigations of Poirier and Cornet, who injected mercury into the muscle of the uterus, and by Bauereisen, who injected tubercle bacilli. Chomé has also shown that streptococcal lymphangitis within the broad ligaments with a suppuration of the preaortic glands did not involve the ovary.

It is my opinion that the corpus luteum abscess is due only to those conditions whereby the ovary is exposed to direct infection by contiguity of tissue and that all abscessed ovaries are not corpus luteum primarily as formerly taught. Infection via the hematogenous route through the hilum of the ovary and from the corpus uteri via the ligament to the ovaries are exceptions. Infection may also pass through the uterine wall and broad ligaments to the ovaries in postabortal and postpartum cases by contiguity of tissue.

The symptoms of a suppurating ovary depend upon the etiology, the length of time affected, the size, and the location. The laboratory findings depend upon whether or not the pus is sterile or infected. The clinical findings depend on whether or not the infection is neisserian or due to some other organism. The symptoms of an acute gonorrheal

pelvic infection, being familiar to all, are not under consideration. If a tubo-ovarian suppuration results as a complication, the pain usually continues on one side (may be bilateral), is more persistent, and fails to respond to treatment as does the usual gonorrheal infection. The temperature continues for a longer time, the white count remains higher; however, both may in time become normal. The sedimentation time continues fast indefinitely, due to infection and to metabolic changes.

In over 10,000 sedimentation tests (University of Tennessee Clinic), it has proved to be of more value from a diagnostic and prognostic viewpoint than any other laboratory procedure. After the exudate has regressed, there remains a fluctuating mass somewhat gourdlike in shape. A large mass, if present, may regress in time, but does not entirely disappear. A rise in temperature, a fast pulse, leucocytosis, a quick sedimentation time, and a painful pelvic mass are present in both the tubo-ovarian abscess and pyo-ovarium.

When the etiology is neisserian, a leucorrhea and other stigmas of gonorrhea are present. Menorrhagia, dysmenorrhea, pelvic pain, etc., may continue throughout the course of either disease. Sterility is often a symptom in gonorrheal infection. If both ovaries are destroyed by infection, as in a case previously reported, amenorrhea may be a symptom.

In a tuberculous ovarian abscess the symptoms are usually insidious in nature, often occurring in the virgin with systemic signs of tuberculosis elsewhere, as the ovary is rarely, if ever, primarily infected. The abscess harbors the tubercle bacillus and at times a mixed infection is present. The abscess may rupture and produce a peritonitis, or develop a fistulous opening into some adjacent organ. If a mixed infection is present, the laboratory findings are of little aid in determining the type of pathology at hand. If pulmonary tuberculosis is diagnosed and a mass is present in the pelvis, without a history of other types of infection, a probable diagnosis may be made.

In postabortive and puerperal infections the symptoms are more abrupt and severe in type. A bilateral cellulitis is usually present at first producing the "frozen pelvis"; therefore, the ovary cannot be palpated until sufficient time has elapsed for absorption of the exudate. If the ovary is left with an abscess formation, the general, as well as the local, symptoms do not abate. The white count remains increased, and the sedimentation time is usually under thirty minutes. Pain and tenderness are present and the dysfunction of menstruation persists.

A pyo-ovarium resulting from a suppurative appendix, peritonitis, or a ruptured viscus, etc., the history and clinical findings are different. The "frozen pelvis" is absent, and the mass is usually unilateral. A history of gonorrhea and pregnancy is absent, but the history of appendicitis, peritonitis, etc., can be obtained. Where an infected fibromyoma, carcinoma, or an instrumentation is responsible in pyo-ovarium,

the acute symptoms are those of an acute unilateral abdomen. In the presence of large pelvic growths the pathology is often masked; however, acute pelvic symptoms appearing under such circumstances should arouse a suspicion of a pyo-ovarium.

In hematogenous pyo-ovarium complicating typhoid, parotitis, influenza, pneumonia, infections of the mouth, etc., the symptoms are those of an acute unilateral abdominal disturbance. In these cases there is an absence in the history of any previous pelvic pathology. Pyo-ovarium may not be suspected in such cases, which may result in serious consequences. The organism present is the same as in the original focus. A continuation of illness after a cessation of the original disease may thus be explained.

The pyo-ovarium varies in size from that of a bird's egg to a grapefruit. It does not obtain great dimensions, as in a tubo-ovarian abscess, or an infected ovarian cyst. The lesion may produce constitutional as well as local symptoms. Such abscesses rarely rupture into the intestine or bladder, but may rupture into the abdominal cavity producing peritonitis. Rupture during an operation or the second stage of labor is hazardous. The etiology of misunderstood pelvic infections following a normal labor can in some instances thus be explained. A pregnant woman with a unilateral ovarian mass should be studied in order to eliminate the presence of infection.

A suppurative ovarian cyst may occasionally produce ovarian destruction. The symptoms in some are most severe, depending upon the bacteria responsible, the size and location of the tumor. It may extend up above the umbilicus and adhere to all surrounding structures. It may rupture into the peritoneal cavity, producing peritonitis, intestinal obstruction, or may empty into the intestines or bladder cavities, or perforate through the abdominal wall forming fistulas. The clinical findings and the laboratory tests are, during the acute stage, in the superlative degree.

A history of exposure to a venereal disease, with positive smears, or the stigmas of a previous gonorrheal infection, justifies one in the belief that the mass is a tubo-ovarian abscess. As the tubo-ovarian abscess is gonococcal in origin, the pus is usually sterile, consequently a spilling during an operation is not nearly so dangerous as in a pyo-ovarium.

Among both groups only frank pus cases diagnosed by the pathologist are reported. In eight pyo-ovariums occurring concomitantly with ten fibromyomas, a chronic pelvic infection existed; however, the tubes were not connected with the ovary and their ostiae were closed. In two fibromyomas and pyo-ovariums the tubes and other pelvic structures were normal; both were infected with the streptococcus. The sedimentation time was less than thirty minutes, but the temperature and white count were normal before operating. In twenty cases of pyo-ovariums chronic pelvic pathology was present, but the tubes were not connected

with the ovaries. In the three deaths there were no evidences of a previous pelvic infection. One patient was apparently infected from a suppurative leaking appendix (see Case 2). In one case a pyo-ovarium co-existed with a fibromyoma. Streptococcus positive. Died of pneumonia on the eighth day.

In a left pyo-ovarium the only tenable explanation was an infection via the hematogenous route from the tonsils or teeth. There was a positive streptococcus growth. Rupture occurred in its removal and death resulted from peritonitis in eight days (Case 1).

TABLE I. SUMMARY OF PYO-OVARIUMS AND TUBO-OVARIAN ABSCESSES

Group 1.—Memphis General Hospital, Nov. 1, 1932, to Jan. 1, 1935.

In 1,366 operated cases of pelvic infections, a suppurative ovary was found in eighty.

PYO-OVARIUMS		TUBO-OVARIAN ABSCESSES	
Right side	6	Right side	8
Left side	6	Left side	16
Bilateral	1	Bilateral	7
Unilateral	14	Unilateral	12
Not stated	6	Not stated	4
	33		47
Positive Wassermann	10	Positive Wassermann	10
Average sedimentation time	39 min.	Average sedimentation time	45 min.
Cultures positive	12	Cultures positive	8
Cultures negative	3	Cultures negative	19
Not stated	13	Not made	20
Average white count	8,879	Average white count	9,580
Fibromyomas	10	Fibromyomas	4

Summary of both groups: Occurrence: Pyo-ovariums, 2.05 per cent; tubo-ovarian abscesses, 3.04 per cent; combined groups, 5.09 per cent.

Positive Wassermann, combined groups, 25.03 per cent: Average sedimentation time—combined goups, fort-two minutes.

Deaths	White	7	0	3 tubo-ovarian abscesses	Shock 1st 24 hr.
	Colored	73	6		Peritonitis 9 da.
	Total	80			Sepsis 17 da.
				3 pyo-ovariums	Peritonitis 9 da.
					Pneumonia 8 da.
					Peritonitis 3 da.

Average age, twenty-four years
Average illness, one and three-fourths years
Average preoperative days in hospital, 10.05
Average mortality, pyo-ovariums, 9 per cent; tubo-ovarian abscesses, 6.05 per cent
Average mortality, combined groups, 7.52 per cent

There were more positive cultures in the pyo-ovariums than in the tubo-ovarian group, the sedimentation time was quicker, and when compared with the blood count, it was out of harmony.

The three deaths occurring in 47 tubo-ovarian suppurations were due to the streptococcus. One of the three patients who had a large fibromyoma died of shock. Two died of streptococcus peritonitis.

The only available reference as to the location of ovarian suppurations is seventeen cases reported by Chomé in which he stated that "Sixteen were on the left side and one bilateral," which does not coin-

cide with the above findings. In only one case was the pneumococcus (Type II) found in a study of 210 suppurating ovaries.

TABLE II

Group 2.—Baptist Memorial Hospital from November, 1933 to May, 1935.

In 696 pelvic infections there were 25 suppurative ovaries.

PYO-OVARIUMS		TUBO-OVARIAN ABSCESSES	
Right side	3	Right side	4
Left side	5	Left side	8
Not stated	1	Not stated	2
		Bilateral	2
	9		16

Occurrence: Pyo-ovarium, 1.02 per cent; tubo-ovarian abscesses, 2.08 per cent; combined groups, 3.06 per cent.
Average sedimentation time, thirty minutes; average white count, 10,883.
Average length of illness, thirteen and one-half months; preoperative days in hospital, eight.

In 25 patients of the last group there was one positive Wassermann (4 per cent), while in the other there were 25.03 per cent positive reactions. One patient who died had been sent home for two months to rest. Upon readmission her temperature was normal, white count 7,050, but the sedimentation time was thirteen minutes. After two weeks' hospitalization, the sedimentation time remained fast (twenty-two minutes). Her general condition was good. The operation was technically difficult, due to the gross pathology. Culture, positive for streptococcus and staphylococcus. Died of shock, first twenty-four hours. All were white and below par as surgical risks.

TREATMENT

Surgery is the only curative treatment. When to operate depends upon the experience and judgment of the surgeon. Sufficient time must elapse for the exudate to be absorbed and restoration to take place (many oophoritis cases will clear up). The average time elapsing before surgical means was instituted in the above cases was one and a half years. However, in pyo-ovarium without involvement of other internal generative organs, it is unnecessary to wait so long, thereby subjecting the patient to the danger of rupture or focal infection.

In the tubo-ovarian abscess where the neisserian organism is responsible longer delay is permissible, as the pus is usually sterile. It is unnecessary to wait for the sedimentation time to reach ninety minutes or over (the rule followed in the University of Tennessee Clinic), for months may intervene and the sedimentation time may remain fast.

A large suppurating ovarian cyst, pointing in Douglas' culdesac should be evacuated first by a colpotomy. Rarely, if ever, should a tubo-ovarian abscess or a pyo-ovarium have a colpotomy. In a large abscess, not pointing in the culdesac, a laparotomy removing the tumor intact is desirable. If unable to remove it in its entirety, suction drainage should precede its extirpation. The presence of dense adhesions and large blood

vessels in the tumor wall may preclude the removal of the entire sac. In such cases the leaving of part of the sac is successfully cared for by nature.

Acute pelvic infections should be treated conservatively, and not until such efforts are futile should surgery be resorted to.

CONCLUSIONS

In pyo-ovariums the streptococcus is responsible in 95 per cent of cases, while in the tubo-ovarian abscess the neisserian organism is primarily responsible. A tubo-ovarian abscess and pyo-ovarium should be differentiated from other pelvic inflammatory pathology; as the behavior and treatment are quite different. The mode of infection of pyo-ovarium is by contiguity of tissue, or through the circulatory system.

An attempt should be made to differentiate a pyo-ovarium from a tubo-ovarian abscess.

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631-35 Medical Arts Bldg.

PELVIC MEASUREMENTS IN THE WHITE AND COLORED FEMALE AND THEIR SIGNIFICANCE IN CHILDBIRTH*

A Study of 1,400 Cases

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DURING my twenty years of obstetric work in the South, I have observed that if we were to depend upon pelvic measurements used in the North as criteria, there would be numerous unnecessary cesarean sections performed. As a matter of fact very little operative interference has been practiced and the results demonstrate the wisdom of such conservatism.

The study of pelvic measurements presented here has been undertaken with two purposes in mind: first, to show graphically the comparisons between negro and white women in the South and to further compare such data with similar data from northern hospitals;† second, to determine to what extent pelvic measurements should be taken as an indication for cesarean section. Over 400 cases have been reviewed from my own private practice and from the Memphis Hospital. This may be considered a small number upon which to base conclusions, but these cases are consecutive and the measurements have been very carefully taken, internal measurements having been recorded in each case. As additional data for comparison, some 1,000 cases have been compiled from the Cook County Hospital, Chicago, where a large number of negro cases are on record. Unfortunately only external measurements are given and emergency cases without complete data break the series. The series is consecutive, however, except for these omissions.

Very little previous work has been done on the comparison of the negro and white pelves. Riggs, in 1904, made his study of the pelves in negro and white women, based on 1,500 cases at the Johns Hopkins Hospital. In this series all cases of premature and multiple births were omitted. Williams, in 1899, studied the frequency of contracted pelves in women, based upon the first 1,000 delivered at the Johns Hopkins Hospital. In addition to that he has very briefly reported upon the occurrence of pelvic deformities in his text (4,000 cases).

Adair has shown that pelves of French women are uniformly smaller than those of American women. Emmons in a study of American squaws, Acosta-Sison of the Philippine, and Lane of Eurasians, East Indians and Bengalis, find that the women of these races are also smaller in pelvic measurements than the American white women.

*Thesis for admission presented at the Forty-Eighth Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, held at Skytop, Pa., September 16 to 18, 1935.

†For lack of space it is not possible to include all of the author's graphs.

In the present study the records from the Memphis General Hospital include age of mother, presentation, para, measurements of the outlet and inlet, length of the stages of labor, cephalic measurements of the child, injuries to the child, injuries to the mother, condition of the placenta, and operative treatment.

The records of the Chicago hospital give the age of the mother, weight of mother, external measurements of the pelvis, remarks on the pelvis, duration of labor, position and operative procedure, molding, child's death, para, and general remarks.

These data show that both white and negro women in the South have smaller pelves than in the North. This study, however, does not show a corresponding difference in the size of the infant head. The difference in pelvic measurements is in accordance with my personal observations.

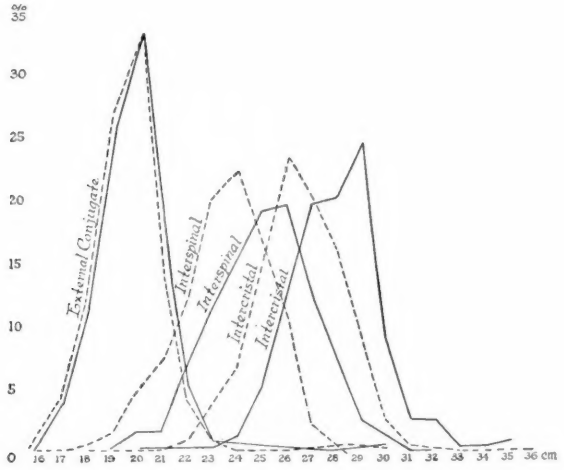

Fig. 1.—Cumulative frequency graph showing external measurements of white (solid lines) and negro (broken lines) women taken at the Cook County Hospital, Chicago.

The smaller size of the negro pelvis, in comparison with the white in the same locality, is shown in the data from both sections. The external conjugate in the negro, however, approximates the external conjugate in the white. For this reason the external conjugate alone cannot be taken as indicative of the comparative size of the pelvis. Although the weight of the negro child is appreciably less than that of the white child there is practically no difference in cephalic measurements. Thus while pelvic and cephalic measurements show a comparatively larger passenger through the passage in negro than in white cases, the conservative treatment at both the Memphis and Chicago hospitals shows clearly that pelvic measurements are not sufficient indication for cesarean section or other operative interference, and has resulted in a very high percentage of spontaneous births.

METHOD OF PREPARING GRAPHS

In preparing the tables the material was taken from the hospital records and condensed into the smallest form possible.

In making the percentage frequency graphs (Figs. 1 to 5), the total number of cases in which a given diameter was reported was counted. This figure was used as a basis on which to calculate the percentage. Then each length in that diameter

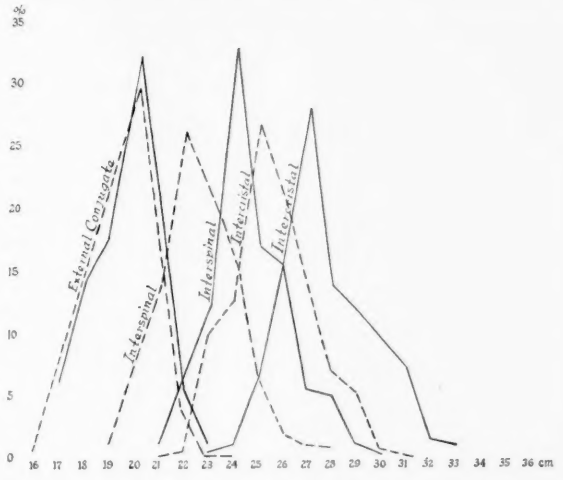

Fig. 2.—Cumulative frequency graph showing external measurements at the Memphis Hospital in white (solid lines) and negro (broken lines) women.

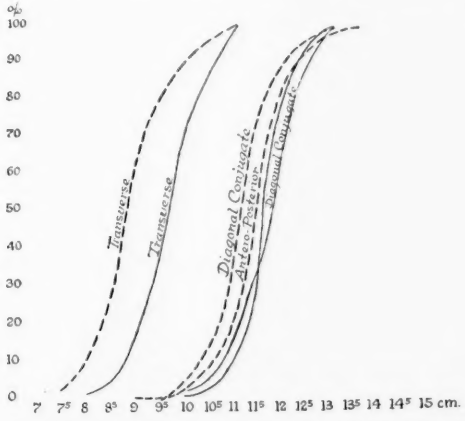

Fig. 3.—Cumulative frequency graph showing internal measurements at the Memphis Hospital of white (solid lines) and negro (broken lines) women.

was counted and from these two figures the percentage for each length within the diameter was figured. The percentages were then plotted as is shown in the completed graphs. The cumulative graphs were obtained by starting with the percentage of the shortest length and then adding to it the others, one additional each time (shortest length, and the next to the shortest, shortest, next to the shortest, and second from the shortest, etc.). The cumulative graph at any one point shows the percentage of cases having that length or less. Since the cumulative graphs move in one direction

only, rather than up and down as does the percentage frequency, it shows to better advantage the difference in the lengths between any two corresponding classes. Thus in the cumulative graphs of the negro and white at the Chicago hospital (Fig. 1) it will be seen that the difference in the external conjugate is only about 0.5 or 0.25 centimeter. On the other hand, the difference between the interspinals

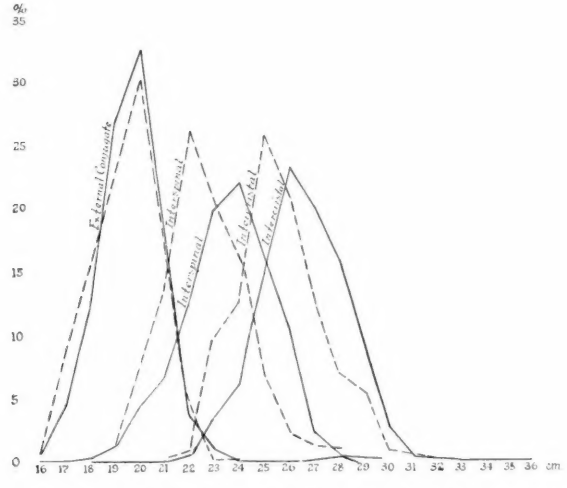

Fig. 4.—Cumulative frequency graph showing comparative external measurements in negro women from the Cook County Hospital (solid lines) and the Memphis Hospital (broken lines).

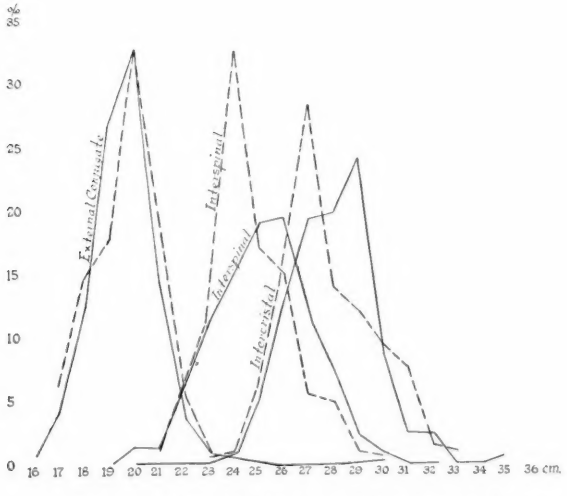

Fig. 5.—Same as Fig. 4 in white women.

diameter, for the greatest length of the graph, is about 2 cm. In the frequency graphs, because of the weight which any one percentage receives, it is impossible to estimate the variation so closely.

In the graph (Fig. 6), showing the weight of the child with reference to the diameters from the Memphis data, the weights for each length within a diameter were averaged numerically and then plotted.

DISCUSSION

It will be seen from the graphs of the material obtained at the Chicago hospital, that there is a considerable difference in the white and negro in some of the measurements. In the external conjugate there is very little difference, the negro averaging about 0.25 centimeter less than the white. When the other measurements are considered, however, a decided difference between the two races can be seen. This averages about 0.5 cm. As stated before, this is more easily seen in the cumulative curves than in the frequency curves.

The graphs from the Memphis hospital show the same tendencies. It would therefore seem that there is a decided difference in certain external measurements in the white and in the negro. This has been found true by other writers also (Riggs, Williams).

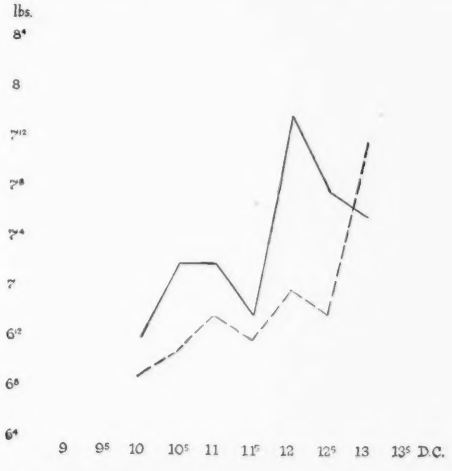

Fig. 6.—Graph showing comparative weights of newborn at the Memphis Hospital: white (solid lines) negro (broken lines).

In the compilation of internal measurements, only the Memphis data can be used since, unfortunately, they were not given in the Chicago records. Those from the Memphis hospital show that the internal diameters of the negro are smaller than those of the white. The transverse shows a uniform difference of about 0.5 cm. The diagonal conjugate is about 0.75 cm. less, while the anteroposterior shows little difference.

As a result of this difference in size, it would seem probable that the negro would have a much harder labor than does the white. This is the case. Jardine in his studies has found that while labor in savage races is comparatively easy, it becomes harder if the child is a half-breed, since the heads of children of civilized races are larger. Comparing the graphs of the measurements of the negro and the white infant head, it was found that there was little difference in size.

An average difference was noted of approximately 0.25 cm. in biparietal and in occipitofrontal. (Riggs has similar findings in his data.) Thus a head practically the same size as the white has to go through a birth canal appreciably smaller than that of the white. I have also found that the head of the negro child is harder to mold than is that of the white child, and this condition contributes to the more severe labors among the negro women. Statements can be found, however, in the literature to the effect that the negro child is smaller, which is true of comparisons based on weight and length (Riggs); it is also said that the head is easier to mold, these statements being made to account for the apparently high percentage of spontaneous births in the negro.

While the graphs of the negro and the white pelves are interesting, they have merely confirmed already established fact that the diameters in the negress are smaller than in the white. When the northern and the southern negro, represented by the Chicago negro and the Memphis negro, are compared, it is seen that there is a difference here which is almost as great as is the difference between the white and the negro. In other words, the northern negro is larger in diameters than is the southern negro; this is also true of the northern white and the southern white. While the point may be raised that there is a possibility of error due to the fact that the measurements were taken by different organizations, my observation has been that this is true. The difference in the pelvic measurements in the northern and the southern cases will be referred to later when considering the indications for cesarean section.

OPERATIVE TREATMENT

Out of the 445 cases under my care no cesarean sections were performed. Many cases came within the limits of elective cesarean section and even, according to some, of absolute indication.

Vaughan has said that in one of the New Orleans hospitals one thousand babies were delivered and forceps were used only four times. No cesarean sections were performed in this series. It would appear that indications for interference with Nature's management of labor are not as numerous as the majority of surgeons have stated.

Among the Chicago cases there were only 9 cesarean sections, and in these there were other indications aside from the pelvic measurements for the operation. Cesarean section should not be performed on the basis of pelvic measurements alone. It may require more skill and more time to deliver a woman per vaginam but unless there are other indications than measurements alone, the patient should be given trial of labor at least. It would seem that a different standard of absolute indication for cesarean section should be recognized in the South than in the North.

There is also a low frequency of other operative interference, there being 5.4 per cent low forceps among the Memphis white and 2.45 per cent among the Memphis black. Version and extraction was performed in

2.4 per cent and 2.1 per cent, respectively. There were then 7.8 per cent operative births and 92.2 per cent spontaneous births among the white. Among the negroes there were 4.55 per cent operative births and 95.45 per cent spontaneous births. These figures are approximately 11 per cent higher for spontaneous births than those reported by Riggs twenty years ago. In a series of 1,500 cases he reported 80 per cent of the white and 84 per cent of the negro births spontaneous. His operations also included besides low forceps, version and extraction, midforceps, high forceps, craniotomy, basiotrypsy, accouchement forcé, and cesarean section.

Injuries to the mother were found to be infrequent, which is undoubtedly due to the lack of interference and conservative treatment given.

CONDITION OF CHILD AT BIRTH

The percentage of serious conditions and stillbirths is much higher in the negro than in the white. While this may be due partly to syphilis, it ought not to be entirely responsible, since most of the patients are treated in the out-patient department before entering the hospital.

SUMMARY

1. There is little difference between the negro and the white in the external conjugate, but the other measurements show considerable difference, the negro being smaller.

2. The internal diameters show variation, the negro being smaller, commensurate with the external diameters.

3. The diameters of the patients in the Memphis Hospital were smaller proportionally than those in the Chicago Hospital.

4. Labor in the negro is more difficult than in the white due at least in part to the size and hardness of the infant's head, although there is little actual difference in the size of the negro and white infant head. Since, however, the birth canal in the negro is smaller than that of the white, the head is relatively larger. The negro head is harder to mold than is the white.

5. Pelvic measurements alone are not sufficient indication for cesarean section. No cesarean sections were performed in the Memphis Hospital though some cases were within the limits of absolute indication. The cases in which cesarean section was performed in the Chicago Hospital were for indication in addition to pelvic measurements.

6. There was little other operative interference, the spontaneous births ranging from 95.45 per cent to 80 per cent.

7. Injuries to the mother were few in number.

8. Abnormal conditions of the child and stillbirths were much higher in the negro than the white.

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THE EFFECT OF EXCESSIVE CIGARET SMOKING ON MATERNAL HEALTH*

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PHYSICIANS who are vitally interested in maternal health look forward to an obstetric millennium in which women will be able to produce perfectly normal children at proper intervals and under such other favorable conditions as will result even in an amelioration of their physical and mental condition.

The obvious and more serious questions, such as lack of prenatal care, meddlesome midwifery, sepsis, abortion, and sterility, are already arresting the attention of leaders of the obstetric art, and the recent surveys in larger metropolitan centers indicate the great necessity for an intensive continuation of the study of the causes of the high maternal mortality and morbidity which exist in this country at the present time.

Without in any way minimizing the importance of meeting the larger problems which face those of us whose labors embrace the field of obstetrics, I desire to call attention to a more subtle and sinister condition which exists among American women today, and that is the excessive smoking and inhaling of cigarets, which during the last two decades has clutched the young women of this country in a manner resembling the invasion of an epidemic working in virgin soil.

My convictions concerning this subject have arisen from personal observations. I have noted the gradual increase in the incidence of smoking among my obstetric patients from a time about twenty-five years ago, when it was practically negligible, to the present day, when it approximates about 50 per cent. I became convinced a few years ago from clinical observation that excessive smoking in certain maternity cases was detrimental to the patients' health, that their nervous systems were rendered unstable, that their digestive functions were impaired, that their respiratory and circulatory systems were definitely affected, and that, in a general way, these patients did not undergo the ordeal of pregnancy, parturition, and lactation with the normality which is observed in other women who either abstained entirely or who indulged in smoking very moderately.

I further observed that a number of expectant mothers consumed from 25 to 40 cigarets a day, and it occurred to me that surely the maternal organism, already overworked by the physiologic demands of pregnancy,

*Read at the Forty-Eighth Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons held at Skytop, Pa., September 16 to 18, 1935.

must surely suffer from the absorption of such a poison as nicotine, which would exert a deleterious influence upon their health.

These observations prompted a review of the literature and stimulated some experimental work on animals with a view of determining, if possible, the effect of nicotine poisoning on the female sex organs.

Hofstätter,[1] a review of whose extensive writings on this subject is most illuminating, discusses reasons why women smoke. He states that heavy smokers start because they are unhappy and that in some instances they are disappointed in their sex life, and that smoking is a reaction against certain thwarted desires. He suggests that they smoke to exhibit a certain freedom and independence and believes that the enjoyment is not a direct one but that it comes from more abstract impulses and that it offers the opportunity for theatrical, and easily assumed, charming, and graceful movements and positions. He thinks that women make more studied movements and make a more formal procedure of smoking than men; he suggests that smoking is done to avoid boredom, that it is a flight from reality, and intimates that in many instances it is a habit associated with odor, watching the blue smoke, and the accompanying movements of the hands, mouth, and respiratory organs. He concludes, however, that the most important reason is a desire for psychic becalming, or narcomania.

I think it is a general observation that few women smoke excessively who are busily and happily occupied and that idleness plays an important rôle in the causation of this habit.

A review of the literature made a year ago[2] indicates that there has been a limited amount of research work done on animals to determine the effect of nicotine poison on their female sex organs and that the conclusions which have been reached have not been concordant.

For example, Ogata,[3] in 1919, observed no apparent changes in the ovaries of rabbits after injecting them with a tobacco filtrate, while Hofstätter found that after injecting dogs, guinea pigs, and rats, repeatedly, the sex function was lessened and follicular development was inhibited.

Unbehan,[4] in 1931, after injecting white mice with nicotine, concluded that with hardly any exception an unfavorable influence resulted on ovarian function, that a cessation of the estrus resulted, and that a degeneration of the ripening follicles occurred with increase in follicular atresia and increase in connective tissue.

Nakasawa,[5] in 1933, observed that after injecting female rats with nicotine the sex cycle was changed, atrophy of the ovary, uterus, and tubes resulted and that a continuation of the nicotine produced sterility because it stopped the menstrual cycle. He injected a group of rats during pregnancy, and while they did not abort, the offspring were weak and died easily.

Sodano,[6] refers to the discordant viewpoints of various authors upon the influence of tobacco upon women who are employed in this industry. He states some observers hold that the lesions of the female genital apparatus in tobacco workers are due to other extrinsic conditions and not to tobacco intoxication, and that the statistical researches conducted in France some years ago showed that tobacco workers exhibited no difference in birth rate and abortion than women employed in other industries.

Sodano claims that nicotine does not act immediately upon the ovaries as does lead and some other toxic substances, but that it produces a disturbance of the function of the thyroid gland which, in longer periods of intoxication, is followed by glandular

dysfunction. He believes that the hyperthyroidism acts by disturbing the function of the abdominal organs, especially the uterus and ovaries, and that it often produces catarrh and inflammation of the vulva, vagina, and uterine mucosa. Sodano experimented with adult white rats by injecting them with a solution of nicotine (0.10 c.c. of a 1:1,000 solution). He observed stupor, violent cramps, dyspnea; and difficulty in maintaining an equilibrium occurred a few minutes after the injection.

At the beginning of the fourth month there was a marked emaciation and loss of hair on the backs of animals injected. His histologic report showed many corpora lutea in full evolution, but he also found a small number of follicles which were atresic. He described changes in the cornua as follows: "Unusual tumefaction of the mucosa with great hyperemia of the vessels which were full of blood. The glandular crypts were more numerous than in the normal condition; the chorion mucosa was more rich in cellular elements which had more abundant protoplasm and an epithelial aspect. The tunica muscularis is hypertrophied and its vessels dilated and filled with blood."

The female rats were injected for a period of six months, receiving seventy injections. At the beginning of the fifth month the animals began to lose weight rapidly and lost hair from their backs and faces; they lost their vivacity and their actions were sluggish. At the end of the fourth month they were coupled with a male adult and only one became pregnant. The rat delivered at term six live offspring which died during the lactation period. The mother herself died suddenly after the death of the offspring and the autopsy showed nothing noteworthy excepting a slight hyperemia of the genitalia and a state of involution. The three rats which were injected after six months showed hyperemia of the genitalia which, in some instances, was very marked. The follicles in the process of maturation were less numerous and the atresic follicles were greatly increased. In some preparations cystic follicles were found.

This author concludes that excessive smoking does not affect the generative tract of women who work in tobacco factories.

Sodano believes that the sterility which occurred in his animals was due to changes which occurred in the mucous membrane of the cornua rather than to disturbances of the ovaries. He further believes that in spite of the prolonged action of nicotine the ovarian follicles may evolve to complete maturation, rupture spontaneously, and thus set free healthy ova which, if undergoing fecundation, will develop normally. He believes that the disturbances of the female genitalia produced by the prolonged use of nicotine may be due to changes in the uterus and tubes. His theory is that nicotine poisoning acts perhaps in an indirect manner on the female genitalia.

Sodano concludes that in his animal experiments the newborn died in the first period of lactation, in spite of regularly sucking the maternal breast. He believes that:

1. Nicotine introduced into adult female rats in small subcutaneous doses does not determine sterility by a direct action of the ovaries.

2. An eventual sterility of the animal may be due to inflammatory catarrhal processes in the uterus and tubes, determined by prolonged administration of the poison.

3. One cannot exclude a certain harmful influence which nicotine has on the product of conception.

At my suggestion Dr. William K. German, pathologist at Blodgett Memorial Hospital, has been experimenting with two healthy adult female rabbits with a view of determining the effect of repeated injections

of nicotine on their sex organs. These experiments covered a period of over nine months. Dr. German's report is as follows:

Two normal female rabbits for a period of over nine months had been receiving injections of a solution of nicotine both subcutaneously and intravenously. The intravenous dose consisted of 1 c.c. of a 1:1,000 solution of the drug. This throws the rabbit into an immediate violent convulsion. The subcutaneous dose was 4 c.c. and was sufficient to produce a more prolonged type of clonic convulsion. These rabbits have withstood the treatment very well and have gained weight. One rabbit was subjected to fertilization. She went through a normal pregnancy and delivered a litter of normal rabbits, all of which died prematurely. The inoculations of nicotine averaged 3 per week over a period of nine months, at the end of which time both rabbits were sacrificed. Ovaries and uteri were examined histologically and no changes could be demonstrated which were not within physiologic limits.

In interpreting the reports of the experimental data of research work done by others to which we have had access, it is our opinion that there is indisputable proof that nicotine produces in some way certain histologic changes in the ovaries of rats, mice, and guinea pigs, and that it also interferes with normal maturation of the follicles. Furthermore, it would appear that these changes are sufficient to produce sterility and to cause changes in the menstrual habits and sex characteristics of the above animals. It also seems certain that the offspring suffer and sometimes die from the effects of nicotine on lactation.

The experimental work with two female rabbits carried out for a period of over nine months by Dr. German indicates that nicotine produces no changes in the sex organs of these animals nor does it impair their reproductive efficiency.

Recently I submitted the following questions to the members of this association: In your opinion does the smoking and inhalation of twenty-five or more cigarets daily have an unfavorable effect upon maternal health? Seventy-five replies were returned: 63, or 84 per cent, answered the question with "yes"; 2, or 2.66 per cent, answered the question with "no"; 5, or 6.66 per cent, answered: "I do not know"; 2, or 2.66 per cent, answered the question with: "Only in the case of individual susceptibility"; 3, or 4 per cent, answered the question with: "No definite opinion."

Some of the remarks accompanying answers to this questionnaire were of interest. Royston feels that excessive cigaret smoking interferes with a well-balanced diet, inhibits desire for normal physical activity, and seems to dull the sensibilities, while others are apparently not affected.

Barney reports the case of a baby a week postpartum who had developed a severe case of nicotine poisoning from the mother's milk, the mother having smoked two packages of cigarets a day.

Davis finds that women who are heavy smokers are much more nervous than the average of his patients.

Cornell reports the case of a baby who was four weeks overdue, with a birth weight of less than four pounds, who showed all the signs of drug withdrawal, and in whom pediatricians thought nicotine was the cause.

Newell states that nicotine in excess makes women unusually nervous, destroys the appetite, and causes insomnia and failure to gain weight.

Gordon tells his patients to limit their cigarets to ten a day without inhalation.

Adair thinks it is inadvisable either during pregnancy or lactation.

Falls advised all his patients to limit themselves to five or six cigarets a day.

Leighton states that excessive smoking in women is "damned foolishness."

Kosmak believes that excessive smoking interferes with proper anesthesia, produces marked nervousness when the smoking is stopped, increases pulse rate, produces annoyance from pharyngeal catarrh, and possible interference with lactation, and that it is a "damned nuisance" in other ways.

Litzenberg advises a limit of six cigarets a day, or none at all.

Hendry believes that intemperance in the use of tobacco is harmful but that a moderate use has no effects on his obstetric patients.

Mathieu refers to such symptoms as bad mouth, tracheitis, cough, mild chronic bronchitis, but he has seen no effects on the offspring.

Phaneuf believes that excessive smoking is injurious to maternal health and that it varies with the constitution of the individual concerned.

Van der Veer states that in his experience a woman's nervous system goes to pieces during excessive cigaret smoking and this in turn affects the unborn child.

Bainbridge thinks that it is especially harmful to girls who have not attained their full growth.

De Lee believes that the continuous inhalation of carbon dioxide and carbon monoxide may have a harmful effect.

James E. Davis remarks that women are usually unable to control the habit and that carbon dioxide illness occurs in rooms where too many are smoking.

Danreuther has observed increased nervousness and tendency to gastro-intestinal disturbances.

Potter, on the contrary, states that the majority of his patients smoke but he cannot find that it affects them adversely.

An analysis of the replies from these seventy-five members of our Association strongly indicates that a cross-section opinion held by leading obstetricians of this country is unfavorable to smoking among expectant mothers, excepting in moderation.

The writer, who subscribes to this opinion, most strongly believes also that in many cases there is in women a strong susceptibility to nicotine, and that complete abstention is in many cases highly desirable and even necessary as one of the safeguards to maternal health.

Hofstätter, in his book entitled *Die Rauchende Frau,* has reported a number of rather unusual cases of susceptibility to nicotine, and I have observed women who are not excessive smokers in whom the nervous, digestive, respiratory, and circulatory systems have been noticeably affected. On the other hand, many women apparently smoke excessively without observable ill effects.

I believe that the indulgence of so many American women in the use of barbiturates and other sedatives for insomnia is frequently associated with excessive smoking.

It would probably be fanatical to state that all women should abstain from smoking, but I believe that it is a responsibility of every physician to warn the young women of this country of the dangers which attend excessive indulgence and of the susceptibility of many to the toxic effect of nicotine, even in a moderate use of cigarets.

Physicians should particularly interest themselves in the question of smoking among young girls during the period of adolescence, at which time this habit may easily produce endocrine imbalance, and at which time self-control, a proper attitude toward matters pertaining to sex, and the development of normal maternal instincts should progress without interruption.

It is my conviction that excessive cigaret smoking has a degenerating influence in many ways upon every woman and that it is prejudicial to her highest efficiency as a sweetheart, a wife, or a mother.

One objection to excessive smoking in women is the difficulty they experience in controlling the habit when they become pregnant. A number of them admit that they cannot limit their smoking during pregnancy in spite of the fact that they are conscious of the unfavorable symptoms produced by it. At the present time I have under observation an expectant mother who frankly admits that she cannot limit her smoking to less than a package of cigarets a day, although she admits that they affect her unfavorably, and notwithstanding the fact that she has been advised as to their possible unfavorable effect on her child. Another young woman who could not control her excessive smoking during the prenatal period was warned postnatally that unless she smoked very moderately the baby might suffer from nicotine poisoning, and she promptly weaned the baby rather than even moderate her smoking.

So far as the clinical symptoms are concerned which arise from excessive smoking or from susceptibility to nicotine, there is no doubt whatever that nearly all of the important functions of the body are to some extent disturbed by it, and physicians should endeavor to evaluate properly its influence and specifically advise each patient who insists on smoking according to her sensitivity to it.

CONCLUSIONS

1. Excessive smoking and inhalation of cigarets is incompatible with the highest ideals of maternal health.

2. Absorption of nicotine in some way produces definite histologic changes in the ovaries of rats, mice, and guinea pigs which results in some instances in sterility and unhealthy offspring.

3. Physicians should inquire more closely concerning the smoking habits of their female patients, a number of whom are susceptible to nicotine.

4. Women during pregnancy and during the period of lactation should either abstain from smoking entirely or limit the number of cigarets to four or five a day.

5. The unfavorable effects of excessive cigaret smoking on maternal health are not sufficiently recognized and are of enough importance to demand a closer observation of clinical manifestations and a continuation of experimental work.

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26 SHELDON AVENUE

THE USE OF CORPUS LUTEUM IN THE TREATMENT OF DYSMENORRHEA*

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THE treatment of dysmenorrhea by glandular therapy has not been successful in the majority of instances; failure has been in part dependent upon the unsuccessful isolation chemically of hormones in pure product.

Recent advance in biologic research by Hisaw and Fevold, Corner, and others, has made the corpus luteum hormone available as a pure product for medical use. We wish to emphasize that many biologic products have been marketed in the past as corpus luteum, which have contained very little of this hormone, if any. These products up to now have had a wide usage and a uniformity of failure in the treatment of dysmenorrhea. This result needs no further explanation.

We have been using a product of a pure corpus luteum hormone designated as corporin, by Hisaw. This preparation has been produced in the laboratories of Hisaw, according to his methods of extraction; it has been biologically tested to show the lack of follicular stimulation in the vagina of animals, which indicates a pure chemical separation of the corpus luteum hormone.†

The rationale of the treatment of dysmenorrhea by corporin has been known for years from the physiologic standpoint. It has been shown

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in the experimental laboratory that the estrogenic hormone causes the uterine irritability and painful contractions, and that corporin is antagonistic to the action of the estrogenic substance, becoming the quieting factor.

We have confined corporin therapy to a definite class of dysmenorrhea patients. This type has been found to have normal genital development and placement; in other words, patients with infantile genital development, cervical stenosis and improper drainage, ovarian abnormalities, or other extragenital conditions which might cause the periodic pain, were excluded from this series of cases.

The dosage of corporin administered was placed at a therapeutic level found to give relief; daily subcutaneous doses of 5 to 8 rabbit units were administered five days prior to the onset of the periodic bleeding. Preparations were used in both oil and alcoholic solutions. Some reddening of the skin was noted at the site of the injections a few hours after. Patients did not complain of pain. No abscess formation or serious reactions were observed at the site of the injections. There were no general systemic effects.

It is of paramount importance that all patients were submitted to thorough physical examinations. Laboratory work included a complete blood count, urinalysis, blood Wassermann, a basal metabolic test and blood calcium if symptoms warranted them. Many well-known hygienic measures were not forgotten as corrective factors; these measures were advised at times to the exclusion of glandular treatment. Emphasis must be placed upon the fact that the cases to be reported show nothing of importance in their general physical examination and laboratory check-up in relation to their periodic pain.

Five cases are to be briefly reported without the detailed physical and laboratory findings since the latter add nothing of importance to this report.

Miss S., aged twenty-two years, white female, newspaper reporter. Chief complaint was dysmenorrhea since onset of periods, which was colicky in type, requiring patient to go to bed for the first day of flow. Onset at twelve years, twenty-eight-day type, five-day flow and moderate in amount. First series of injections of five doses of 8 rabbit units gave slight relief but patient did not go to bed. Second monthly series of five doses of 8 rabbit units gave marked relief and very little pain. The third series of a similar dosage gave complete relief; and the fourth series produced the same result as to relief with the flow increased. Patient was then allowed to go for two months without any treatment and during this time she had two periods unaccompanied by pain. The follow-up treatment in this case has been intermittent. Results may be classified as excellent.

Miss M., aged eighteen years, white female, sophomore in college. Chief complaint dysmenorrhea since onset of periods requiring bed rest the first forty-eight hours of flow. Periods were colicky in type, thirty-day interval, profuse flow with clots, and no intermenstrual bleeding. First series of injections 5 doses of 6 rabbit units gave "50 per cent relief" as stated by the patient. Second series of 5 doses of 8 rabbit units gave marked relief with only slight pain. The third series, 5 doses of 8 rabbit units gave complete relief without premonition of the onset of flow.

This patient stated that as long as she could remember she had never been free of menstrual pain until the beginning of the corporin treatment. This patient is to receive subsequent treatment.

Mrs. L., aged twenty-one years, white female, artist. Severe dysmenorrhea since onset at thirteen years. Periods were regular, twenty-eight-day type, flow three days and moderate. Partial bed rest has always been necessary for the first forty-eight hours. First series of treatments were given a year ago with 5 injections of 8 rabbit units with only partial relief. Second series of 5 injections of 8 rabbit units gave marked but not complete relief. The third series of 5 injections of 6 rabbit units were given with almost complete relief but a decided increase in flow. Following this injection, the patient wintered in Arizona where she remained free from menstrual pain. She returned to Wisconsin during the early summer with a reappearance of her menstrual pain which was again relieved by corporin injections.

Mrs. T., aged twenty-two years, married, nurse. Severe dysmenorrhea since the onset at fourteen. Periods were regular, four to five days' duration, moderate amount, and severe pain during the first two days. First series of 5 injections of 5 rabbit units gave very little relief. Second series of 5 doses of 8 rabbit units gave, in the patient's opinion, only 50 per cent relief. The third series of 5 doses of 8 rabbit units produced little or no relief. A fourth series of 5 doses of 8 rabbit units gave considerable relief. A fifth series of 5 doses of 8 rabbit units once again produced only partial relief. The patient's estimation of the relief was no better than that obtained by drugs before she started on the corporin treatment. The writer cannot classify the results in this case as impressive.

Mrs. L., aged nineteen years, white female, maid. Menses always painful since the onset at thirteen years and severe enough for bed rest. Periods were regular, twenty-eight-day type, and four days of moderate flow. First series of 5 injections of 6 rabbit units gave excellent relief. Second series of 5 injections of 8 rabbit units gave almost complete relief. Third series of 5 injections of 8 rabbit units gave comparable results. This patient has been without injections for two months and has had very little discomfort with her last two periods, but some increase in flow has been noted. This case shows once again a temporary relief of symptoms following the use of corporin.

SUMMARY AND CONCLUSIONS

No assurance can be given to the patient as to the permanence of relief after the discontinuance of all corporin treatments. Our small series of eleven cases presents some hope as to temporary relief after discontinuance of treatment. Much larger series of cases must be studied over a longer period of time to make a proper evaluation.

The corporin dosage in this series is not conclusive. In many instances much smaller doses may have produced comparable results; and perhaps in other cases the dosage should have been larger. It was our intention to find a dose that would convince us that dysmenorrhea could be relieved by corporin. Since we are now certain that corporin can be of value in the treatment of dysmenorrhea, we plan to study the questions of dosage and vehicle.

The effect of corporin on the amount of menstrual flow cannot be determined at this time.

It is safe to conclude that corporin can be used in selected cases with excellent relief; and, corporin, like all other medical treatments, will have its absolute failures and its partial and complete successes.

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A COMPARISON OF DIFFERENT METHODS FOR MEASURING RENAL FUNCTION DURING PREGNANCY

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DURING recent years numerous tests of kidney function have been developed. In general, each of these tests belongs to one of three types: (1) a measure of the ability of the kidneys to concentrate and dilute urine, (2) a test of the efficiency of excretion of catabolic waste products, and (3) a measure of the elimination by the kidneys of a foreign substance introduced into the body. The value of tests representative of each of these types in different clinical states has recently been discussed by one of us.[1]

The purpose of this communication is to report the results of a study of the comparative value of three different tests of renal efficiency during pregnancy.

METHODS

Kidney function was measured in a series of forty-eight cases of pregnancy. Most of the patients studied showed no abnormality during the course of their pregnancy; a small number had definite toxemia. In most of these patients kidney function was measured by each of the following methods: the Lashmet-Newburgh concentration test,[2, 3] the Van Slyke and Cope blood urea clearance test,[4] and the fractional phenolsulphonephthalein excretion test as described by Chapman and Halstead.[5] Thus a test representative of each of the above mentioned types was employed.

The following values have been considered by the originators of the various procedures as normal. During a concentration test the nonprotein specific gravity* of the urine should reach 1.029 or higher. Normal urea clearance values range from 75 to 125 per cent; values above 125 per cent are considered as evidence of hyperfunction of the kidneys; values below 75 per cent, as indicating impairment of renal function. During the first fifteen minutes of the fractional phenolsulphonephthalein test, 28 per cent or more of the injected dye should be excreted.

Since this report deals only with comparative results of these three procedures, no discussion of clinical findings or classification of the toxemias will be entered into.

*Throughout this article the concentrating ability of the kidneys is reported as the maximum *nonprotein* specific gravity of the urine.[3]

RESULTS

In the small group of patients in which impairment of kidney function was detected it was found that the results of the concentration test and the blood urea clearance were in close agreement. The fifteen-minute dye excretion in this group usually indicated impairment of function, also.

Data from three representative cases of this group are presented in Table I.

TABLE I. RESULTS OF KIDNEY FUNCTION TESTS IN CASES WITH RENAL DAMAGE

PATIENT	DATE	EXPECTED DELIVERY DATE	BLOOD PRESSURE MM. HG	URINE		CONCENTRATING ABILITY SP. GR.	UREA CLEARANCE PER CENT	P.S.P	
				PROTEIN	SEDIMENT			15-MIN. PER CENT	2-HOUR PER CENT
E. H.	12/ 9/34	2/14/35	180/120	++++	Casts and renal epithel.	1.029	92	17	62
	12/19/34		Same	++++	Same	1.024	57		
	1/ 2/35	Pregnancy interrupted							
	1/14/35			++++	Casts and renal epithel.	1.023	34	21	59
	1/30/35			+++	Casts		44		
C. J.	3/23/35	4/30/35	172/122	++++	Casts, R.B.C. and renal epithel.	1.024	58	11	66
	4/ 1/35		Same	++++	Same		52 55		
	4/ 9/35								
	4/12/35	Delivery							
	4/24/35			++++	Casts Few R.B.C.	1.023	83		
B. B.	6/ 7/34	12/15/34	190/96	+	Casts	1.024	60	26	68

In the group of cases of normal pregnancy, which comprised the majority of patients studied, whenever the concentration test showed normal renal function, the blood urea clearance likewise was normal or, in a few cases, indicated hyperfunction. The fifteen-minute phenolsulphonephthalein excretion, however, was below normal in the majority of these patients (Table II).

During the first part of this study dye excretion was measured, using voided urine. It was thought that incomplete emptying of the bladder might account for the frequently observed low fifteen-minute phenolsulphonephthalein excretion. Accordingly, in a series of patients the test was performed twice on each individual, on successive days, in exactly the same manner, except that on one occasion the urine was voided, on the other it was obtained by catheter, care being taken to empty the bladder completely. The results of this study are shown in Table III. It is seen that in only one case when the fifteen-minute dye excretion was low using voided urine, was it normal when the specimen was obtained by catheter.

DISCUSSION

It has been shown by Van Slyke and his coworkers,[6] and others, that the total two-hour phenolsulphonephthalein excretion shows impairment

TABLE II. RESULTS OF THE DIFFERENT TESTS OF RENAL FUNCTION IN CASES WITHOUT MEASURABLE RENAL DAMAGE. DYE EXCRETION WAS DETERMINED FROM VOIDED URINE.

PATIENT	MONTH OF PREGNANCY	CONCENTRATING ABILITY SP. GR.	UREA CLEARANCE PER CENT	P.S.P.	
				15-MIN. PER CENT	2-HOUR PER CENT
M. L.	2½	1.029	86	35	78
L. K.	2½	1.030	86	28	72
F. W.	8	1.032	126	30	67
M. K.	8½	1.031	77	28	78
M. K.	9	1.035	140	32	68
J. W.	9	1.032	137	35	77
E. T.	9	1.029	120	37	74
E. H.	7	1.029	92	17	62
F. D.	8	1.029	120	13	72
T. B.	8	1.035	115	18	79
M. W.	8	1.035	100	13	81
V. B.	8	1.031	79	17	65
A. B.	9	1.030	112	9	85
B. M.	9	1.030	103	19	45
E. S.	9	1.029	83	6	50
M. T.	9		113	14	68
B. A.	9		100	25	71
L. L.	9		109	8	59
H. M.	9		105	15	65
H. M.	Postpartum			30	

TABLE III. COMPARING THE FIFTEEN-MINUTE DYE EXCRETION DETERMINED FROM VOIDED URINE AND FROM URINE OBTAINED BY CATHETER

PATIENT	MONTH OF PREGNANCY	UREA CLEARANCE PER CENT	PHENOLSULPHONEPHTHALEIN EXCRETION		
			15-MIN. URINE VOIDED PER CENT	15-MIN. URINE BY CATHETER PER CENT	2-HOUR TOTAL PER CENT
B. A.	8	100	25	23	71
J. R.	9	130	24	17	77
M. E.	9	99	23	19	92
L. M.	9	134	21	20	80
I. M.	9	82	21	22	
M. M.	9	108	31	24	75
C. W.	7	133	19	22	66
M. K.	8	110	16	19	67
R. S.	9	94	13	30	63
V. A.	9	109	8	19	93
M. F.	9	79	8	4	78
F. P.	9	88	8	10	54

of renal function only when the kidney damage has become extensive and severe. Stander[7] has found that the two-hour phthalein test is of no value in cases of mild kidney damage during pregnancy. This fact is well demonstrated by the data shown in Table I. In each of these

patients impairment of renal function is shown by the concentration test and by the blood urea clearance, but the two-hour dye excretion is normal.

Chapman and Halstead[5] have demonstrated that a measure of the fifteen-minute excretion of this dye is a much more sensitive test of kidney function. It was for this reason that the fifteen-minute test was employed in this study. In the limited opportunity for study of kidney function early in pregnancy, this test agreed with the results of the concentration test and the blood urea clearance. However, during the last months of pregnancy it was entirely unreliable.

It has been shown that the low values for fifteen-minute phthalein excretion are not in most cases due to residual bladder urine. In practically every patient showing low fifteen-minute excretion, as much dye was excreted in two hours as in those patients with normal fractional output, indicating that the dye was delayed in reaching the bladder. It is likely that the added circulation of the fetus and the physiologic dilatation of the upper urinary tract which has been shown to exist in the majority of women in the latter part of pregnancy[8] may account for this failure to recover the normal amount of injected dye in the fifteen-minute period.

CONCLUSIONS

1. The results of the performance of three representative kidney function tests on each individual in a series of cases of pregnancy are reported.

2. The Lashmet-Newburgh concentration test and the blood urea clearance were found to be satisfactory tests of renal function throughout the course of pregnancy. Results of these two tests were generally in close agreement.

3. The two-hour phenolsulphonephthalein test does not measure impairment of renal function until kidney damage is severe.

4. The fifteen-minute ("fractional") phenolsulphonephthalein test is unreliable as a measure of renal function during the last three months of pregnancy.

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SODIUM AMYTAL AND MORPHINE IN LABOR

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IN 1934, while studying the comparative value of sodium amytal, sodium amytal and scopolamine, the Gwathmey method, and avertin, we found that sodium amytal and scopolamine gave the most satisfactory results as far as analgesia and amnesia were concerned. However, the most serious objection to this combination of drugs was that about 40 per cent of the patients were quite restless, sometimes requiring one-fourth grain of morphine. With the thought of eliminating the restlessness we gave to each of 13 patients from $\frac{1}{12}$ to $\frac{1}{8}$ gr. of morphine with 9 gr. of sodium amytal. We found this dosage of morphine insufficient.

Ninety-one women in labor were given 9 gr. of sodium amytal by mouth and $\frac{1}{6}$ gr. of morphine by hypodermic. At the time the drugs were given the patient was usually having four- to five-minute pains and the cervix was from 2 to 3 fingers dilated. Sixty-four were primiparas and 27 were multiparas. Seventy-eight patients required no more than the initial dose. Eight received an additional 6 gr. of sodium amytal each. Three received an additional 6 gr. of sodium amytal and $\frac{1}{6}$ gr. of morphine. Two patients were given $\frac{1}{4}$ gr. of morphine to control restlessness. When additional relief is required late in the first stage, 6 gr. of sodium amytal alone will usually be sufficient. Earlier in the first stage, additional relief may be procured by giving an additional 6 or 9 gr. of sodium amytal and a second dose of $\frac{1}{6}$ gr. of morphine.

It takes about twenty minutes for the drugs to take effect. After this period of time, however, the patient goes to sleep. She may or may not wake up and moan with each pain, but as soon as the pain is over, she falls asleep again. A few of our patients sat up and complained or squirmed about during the pains, but fell asleep as soon as the pains subsided. The effects lasted from four to six hours.

Analgesia was considered good when the patient had complete relief during pains and rested well between pains. It was considered fair when the pains were only partially relieved, and poor when the pains were slightly or not at all relieved. Ninety out of 91 patients had good or fair analgesia.

Amnesia was considered good when the patient remembered absolutely nothing about her pains or delivery. It was considered only fair when she remembered very little, and poor when she remembered a good deal about her pains and delivery. Of our 91 patients, 46 or 50 per cent had either good or fair amnesia.

Only 2 patients were sufficiently restless to require special attention. Nine patients are recorded as slightly restless, by which we mean that the patient tossed about somewhat or squirmed during a pain, but as soon as the pain was over, she fell asleep again. In contrast to the patients to whom we gave sodium amytal alone or sodium amytal and scopolamine, we used no sideboards on the beds of these patients because we found that they were perfectly safe without them.

Practically all the patients in this series cooperated well in the second stage, bearing down when they were told. They did not squirm about on the table nor undo the sterile drapes as we frequently observed in our previous series.

Labor was not prolonged if the drugs were given when the patient was really in labor. The average duration of labor for the primiparas was seventeen hours; for the multiparas it was a little under eleven hours. Most of the patients slept from four to six hours following delivery.

Of the 91 patients, 50 delivered spontaneously, 24 by elective low forceps, while the remaining 17 were indicated operative vaginal deliveries of one type or another. The third stage was normal in 90 patients. One of the patients who was delivered by forceps had a postpartum hemorrhage of about 1,000 c.c., due to a prolonged and poorly given anesthetic. There was no maternal mortality.

Twenty babies were slightly apneic at birth, but not sufficient to require any treatment. Eight babies were sufficiently asphyxiated to require a moderate amount of resuscitation. In 5 of these 8 cases, the mothers had received the sodium amytal and morphine within two hours of delivery. It is a well-known fact that morphine alone, used late in the first stage, often causes fetal asphyxia. There were 3 stillbirths in this series. One was due to a cerebral hemorrhage, while two were monstrosities.

Table I shows how sodium amytal and morphine, in the dosage described, compares with the other drugs reported by us previously. Rest-

TABLE I. COMPARATIVE ANALGESIA

DRUG	NO. OF CASES	DRUG ACTION (HOURS)	ANALGESIA (GOOD AND FAIR) PER CENT	AMNESIA (GOOD AND FAIR) PER CENT	RESTLESSNESS PER CENT	ASPHYX. BABIES PER CENT	AVERAGE DURATION LABOR (HOURS)	POSTPARTUM HEMORRHAGE (PER CENT)
1. Sodium amytal	60	2-3	58.3	28.0	33.3	8.3	14.6	0.0
2. Sodium amytal and scopolamine	53	3-4	92.4	67.9	39.6	1.8	16.4	0.0
3. Sodium amytal and morphine	91	4-5	98.7	50.5	2.2	8.7	15.5	0.0
4. Gwathmey	50	2-4	74.0	8.0	8.0	20.4	20.4	0.0
5. Avertin	40	1-3	79.7	17.5	2.5	14.8	14.8	32.5

lessness has been reduced from 33.3 per cent and 39.6 per cent to 2.2 per cent. Amnesia, however, has been reduced from 67.9 per cent (for the sodium amytal and scopolamine group) to 50.5 per cent. The number of asphyxiated babies has apparently increased, but it should be noted that in over half of these cases, the drugs were given rather late in the first stage. Another point to keep in mind is that the asphyxiated babies are easily resuscitated. No baby has been lost due to the use of the drugs. Analgesia was good or fair in 98.7 per cent of the cases.

SUMMARY AND CONCLUSIONS

In our first publication we were not very enthusiastic about sodium amytal because of the high incidence of restlessness, the frequent use of forceps, and the high percentage of asphyxiated babies. In our second paper we pointed out that sodium amytal and scopolamine seemed to be superior to sodium amytal alone, to the Gwathemy method, and to avertin as far as analgesia, amnesia, and asphyxiated babies were concerned. Here, too, we called attention to the very high incidence of restlessness (39.6 per cent) as a serious objection.

Sodium amytal and morphine, in the dosage mentioned, gives 98.7 per cent of good and fair analgesias, only 50.5 per cent of good and fair amnesias; but the restlessness has been cut down to 2.2 per cent. The percentage of asphyxiated babies is 8.7. The patients are cooperative in the second stage and there is no increase in operative deliveries due to the drugs used. We do not wish to make extravagant claims for this particular combination of drugs or for any of the barbiturates, but we do believe that the marked reduction in the restlessness and the greater cooperation in the second stage are distinct improvements and are worthy of being brought to your attention.

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Criticizing a medicolegal expert in a case of presumed digital defloration, the author demonstrates the usual incompetency of the expert regarding gynecologic matters and, with Garfami, laments the fact that still too frequently medicolegal problems of a delicate nature are entrusted to physicians lacking in specific knowledge concerning such problems.

August F. Daro.

THE EFFECTS OF RADIATION ON THE HUMAN OFFSPRING*

Present-Day Views

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DURING the past year a questionnaire was sent to the members of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons with a request for case histories, the study of which would throw light upon the effects of radiation on human offspring. Answers to the questionnaire showed considerable interest but offered surprisingly little indication of any widespread understanding of the subject.†

In the nature of things, first-hand experience of any single gynecologist is likely to be limited. The following review was therefore undertaken in order more clearly to present our present-day knowledge and to indicate aspects of the subject in which more widespread interest is desirable.

Reviews of the literature may be found in the writings of Flaskamp, Faerber, Murphy and Goldstein, and the present review attempts to present in its bibliography those significant articles which will enable the student quickly to orient himself on the subject.

Each year abstracts appear in the yearbooks of *Radiology, Gynecology and Pediatrics*, making available considerable information which is not easily accessible to most physicians.

The subject may be considered in two main divisions: (1) The effect on the immediate offspring or subsequent children of the person irradiated. (2) The effect, if any, on the future descendants of the irradiated person of the second and subsequent generations.

So far as we know the effect of radiation on the genes has never been proved for human beings. The evidence from animal experimentation is suggestive but not yet definite.

The effect of radiation on the immediate human offspring may be considered under two headings: (1) The effect of radiation given (a) early or (b) late during pregnancy. (2) The effect of radiation on offspring conceived subsequent to radiation therapy. In this latter group, Wintz distinguishes "early" from "late" conceptions. By "early" is meant conception in the first few months after application

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†The article here published is in abstract, the complete report, with cases, may be found in the current volume of the Association's Transactions.

of a temporary sterilizing dose. "Late" conception is that which takes place after the end of the temporary amenorrhea. He states that the common view is that phenotypical and perhaps genotypical injury is possible in the case of early conception, whereas in late conception the ovum would recover completely before it is capable of being fertilized.

Wintz mentions 500 children born to women after temporary sterilization in whom no phenotypical injuries were observed. He states that the experiments of H. J. Muller with banana flies which pointed toward injury of the genes constituted early and not late fertilization and, he adds, that experiments with mammals carried to the F6 generation showed no injury.

Nürnberger in 1930, after careful analysis of experimental data on the Drosophila, concluded that breeding which is done more than fourteen days after radiation of the flies is not followed by any effect on subsequent generations.

Timofeeff-Ressovsky in 1931 reported that the results of his experimental study with the Drosophila tended to deny the existence of any pronounced after effect of x-ray radiation on mutability.

Little and Bagg described four anomalies which appeared as recessive hereditary characteristics in x-rayed mice; unfortunately no mention was made as to the time interval between x-ray treatment and breeding. There were probably early fructifications. It would seem that there is a good opportunity to repeat this work, comparing the effects on the genes by breeding at varying time intervals after x-ray treatment of the mice.

Bonnevie, working with the strain of Little and Bagg x-ray mice, concluded that the whole group of anomalies were a manifestation of action of one recessive gene cooperating with a series of other genes, or groups of genes, modifying this effect. She notes that the effect on this gene causes an augmentation of the cerebrospinal fluid due to formation of embryonic blebs.

Hanson and Hayes, using the Drosophila, present evidence that the beta particle of radium is the effective agent in gene change and they add "these results apply to x-rays as well as radium." If this be so it would seem profitable to repeat the experiments of Little and Bagg using only gamma radiation, both for early and late impregnations.

It has been noted that there is a tendency toward abortion in the first pregnancies following radiation treatment whereas later pregnancies are more often normal. It seems likely that in many of the early cases abortion is caused by the disease of the uterus or adnexa for which treatment was instituted or by the effect of radium on the generative organs themselves rather than as the direct effect upon the fetus.

Archangelsky listed the possible mechanisms by which the fetus itself is damaged during pregnancy:

1. By direct effect on the fetus itself, especially the blood-forming organs, lymphatic tissue, endocrine glands, and central nervous system.

2. By indirect effect on uterine musculature and endometrium.

3. By indirect effect on the ovary.

4. By indirect effect on the fetus caused by formation of leucotoxines. (Massive doses of x-radiation applied to carcinoma at a distance from the pelvic organs have apparently produced death of the fetus, microcephaly and other typical lesions of radiation damage.)

Considerable experience in the use of x-radiation for the production of therapeutic abortion has been reported by Mayer, Harris and others. Sixty per cent S. E. D. delivered to the center of the pregnant uterus in the early months will invariably destroy the fetus with no demonstrable effect on the placenta.

A personal communication from Harris and Mayer shows an experience of 200 cases. The last 150 when subjected to their technic were followed by complete spontaneous abortions in an average of two and one-half weeks. None of these cases showed subsequent amenorrhea. One patient was aborted by this method twice and another three times.

Many instances have been reported by Murphy, Goldstein and others, showing microcephaly and other serious developmental defects of the central nervous system following therapeutic x-radiation during pregnancy. On this point there is general agreement that such a high proportion of serious defects may be expected that great care should be taken to obviate irradiating a pregnant woman, or if such treatment be given by mistake, pregnancy should be interrupted.

Daniel feels that doses up to 20 per cent S. E. D. may possibly be given without fetal change. Doses from somewhere between 15 and 35 per cent S. E. D. will allow pregnancy to progress normally but with more or less serious damage to the fetus. Since the ovarian castration dose is usually calculated at about 35 per cent S. E. D., the danger becomes apparent. It is generally stated that from a given dose there is greater effect in early than in late pregnancy.

Mazer and Spitz report twenty-six healthy children born to women who had received x-radiation to the pituitary and ovaries for the treatment of scanty or absent menstruation. Radiation was described as 127 k. v., 5 m. a., 14-inch distance, 5 mm. aluminum filter for three to five minutes, calculated 7.5 to 12.5 per cent S. E. D. or 50-80 r. (Exact dosage to ovaries not stated nor length of follow-up for the children.)

Wintz is opposed to the use of x-radiation for the purpose of producing therapeutic abortion except in very carefully selected cases in which the patients are too sick for operative abortion. He warns that a dose less than 60 per cent S. E. D. might be given inadvertently, allowing pregnancy to proceed.

Faerber quotes results of animal experimentation which seem to show that the same quantity of radiation applied to different animals under otherwise comparable circumstances does not always bring about the same degree of damage, and he recalls that even after considerable radiation treatment normal children have been born.* It is therefore suggested by him that there may be other individual factors of susceptibility of which we know nothing. However, we must remember that there is considerable variation in the quantity of radiation delivered under various technics, and also with the same technic unless the apparatus is constantly under standardization.

It would seem more difficult to estimate the effects of radiation given by radium, for we must consider not only the variations of technic but also many other factors which are not so easy of estimation, such as the quantity of amniotic fluid, the location of the placenta, and the position of the fetus in utero, all of which would cause great variations in the radiation effects.

In 1931 resolutions were passed by the two National Societies of Germany concerned with Heredity and Racial Hygiene, as follows:

"1. All persons in whom there is a suspicion of radiation damage to the ovaries should have no children.

*e.g. Lacomme reports x-radiation, 5 treatments, one and one-half hours each for fibroid in a thirty-nine-year-old para iv at fourth month of pregnancy. Normal child and two subsequent babies born. Radiated child normal at age three.

Another patient, age thirty-seven, para iv, had 3 treatments of 400 r. each in second and third month. Normal child delivered at term. Had only rickets due to poor nutrition in second year of life.

"2. If conception occurs, pregnancy must be interrupted on eugenic grounds for one cannot know that the genes have not been injured.

"3. If a fetus in utero is irradiated the pregnancy must likewise be interrupted on eugenic grounds."

Nürnberger discusses these warnings, indicating the encouragement they give to damage suits of various kinds. He agrees with Wintz that patients should be warned against early conception, admitting the possibility of fetal damage in this group as indicated by the work of Oskar, Gunther, and Paula Hertwig, though no proof of such action in the human being has been brought forward. Wintz pointedly remarks in this connection that all diagnostic as well as therapeutic irradiation in the region of the male or female sex glands would have to be given up if the warning of the two German Societies were strictly heeded.

Any study calculated to show the presence or absence of the effects of radiation on the genes would necessitate the compilation of a large number of very carefully reported cases and family histories.

Maurer proposed that such information should be assembled at some central institution and that follow-up examination of the children should be secured every three years, and he gives an outline of significant information which should be gathered as completely as possible to accompany each case report. In addition to the usual history and physical examination of the child which is supposed to have been subjected to the effects of radiation, one should indicate the physical and psychic deviations from normal as compared with older siblings.

SUMMARY

It seems reasonable to advise that the use of radium and x-ray during pregnancy for treatment purposes be restricted to very clear and urgent indications, and that the use of diagnostic x-ray examinations be not too frequently repeated during pregnancy.

In view of the resolutions of the two German societies, it would seem wise, as Nürnberger suggests, that physicians using radio-active agents for the production of temporary amenorrhea should make written records warning the patient and her husband against early subsequent pregnancies and that these warnings should be acknowledged in writing.

It seems advisable to interrupt any pregnancy which has been subjected to therapeutic radiation, for it is generally admitted that serious radiation effects on the offspring will result in a high percentage of cases. These effects are proportional to the amount of radiation and are more serious in early pregnancies, though the fetus may be seriously injured at any stage of development.

It is to be hoped that no opportunity will be lost to place on record any significant case which shows the effect of radiation on the human offspring together with sufficient data to make the report useful. Cases of carcinoma of any part of the body which are treated during pregnancy with survival of the child are of particular value.

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PREGNANCY FOLLOWING RADICAL RESECTION OF THE RECTUM FOR CARCINOMA

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ALTHOUGH the subject of carcinoma of the rectum is represented by an extensive literature, the association of pregnancy with this disease has received comparatively little attention. That this is true is not surprising when one considers that the age incidence of carcinoma of the rectum lies, for the most part, beyond the period of reproduction, as is shown by the compilations of Karsner and Clark.[1] Extensive surgery had for years mutilated the generative organs thus forestalling the possibility of future pregnancies. Even now, while the uterus and its appendages are usually preserved during the radical operation, it is still the vogue with many operators to utilize these organs to help form a new pelvic floor at the site of the resection. Even when this is not necessary, various procedures have been instituted from time to time to effect sterilization, because of the opinion, as voiced by Katz and Kaspar,[2] and Katz,[3] that pregnancy at times apparently favors the recurrence of carcinoma of the rectum. This same net result, i.e., sterilization, has more recently been accomplished as a by-effect eventuating from the follow-up x-ray therapy.

To Lever,[4] in 1843, is attributed the first description of a case of carcinoma of the rectum complicating pregnancy. From then until 1905 Nijhoff[5] was able to assemble only 22 cases of this disease associated with pregnancy. Hochenegg[6] in 1908 could cite 6 cases in which women who had had sacral resections for carcinoma of

the rectum subsequently went through pregnancy. In 1926 Katz and Kaspar[2] presented a critical summary of 18 cases of carcinoma of the rectum relating to pregnancy, and they also included an excellent bibliography on this subject. This field of inquiry has more recently been discussed in the communications of Katz,[3] Tagliaferro[7] and Mengert.[8]

The case here reported illustrates the innocuous course of two pregnancies following abdominoperineal resection of the rectum and permanent colostomy.

Mrs. L. W. (Unit No. 42.) The patient was a twenty-five-year-old American housewife who entered the Strong Memorial Hospital on Oct. 1, 1931, with a complaint of bloody mucoid stools of five months' duration. For years she had been constipated, requiring active cathartics. During the last of her four pregnancies, all of which ran normal courses, the constipation was particularly distressing. There was, however, no recognizable bleeding until shortly after the delivery of her last child. She also had had small external hemorrhoids but these caused her little trouble and no bleeding. Her weight had fallen from 128 to 119 pounds in three months. Her past medical history included diphtheria, chickenpox and mumps in early childhood, and influenza at the age of thirteen. There had been no recent symptoms referable to the cardiorespiratory, genitourinary or locomotor systems. There was no family history of carcinoma or of rectal trouble. General physical examination was essentially negative save for the presence of a fungating mass that could just be felt on rectal examination. Laboratory findings: Blood: Hb. 70 per cent; R.B.C., 3,500,000; W.B.C., 9,900 on which the differential count was normal. Wassermann, negative. The urine was negative except for a faint trace of albumin. The stools gave a strongly positive reaction to benzidine. A barium enema showed redundancy of the sigmoid but no obstruction or fixation in the colon. On proctoscopy a large purplish polypoid mass was seen about 8 cm. inside the anus. Biopsy showed an invasive epithelial growth rich in mitoses, definitely establishing the diagnosis of carcinoma of the rectum. Radical abdominoperineal resection of the rectum was performed in one stage by Dr. W. J. Merle Scott on Oct. 30, 1931. The tumor was an adenocarcinoma 6 cm. in diameter which almost completely encircled the lumen of the bowel about 3 cm. below the rectosigmoid junction. There was no definite evidence of metastasis to the peritoneum, mensenteric lymph nodes, or liver. The posterior surface of the uterus contained roughened fibrinous areas presumably resulting from a previous inflammatory process. Using the cautery, the colon was divided just below the sigmoid, and the proximal end brought out just lateral to the left rectus abdominis muscle as a permanent colostomy. The distal portion of the bowel was dissected out of its bed and away from the cervix and vagina, and the site of dissection was covered over with peritoneum from either side. After closure of the abdomen, the patient was placed in the perineal position and the rectum removed intact by dissection through the para-anal skin, the perineal and levator ani fasciae and muscles. The patient made an uneventful recovery and was discharged from the hospital on Dec. 11, 1931, forty-three days after the operation. The perineal wound healed promptly and the colostomy functioned in a satisfactory manner.

On June 12, 1933, about nineteen months following the operation, the patient was again seen, this time in the prenatal clinic. At this time she was some six months pregnant. Her general condition had been good and her pregnancy was uncomplicated by albuminuria, edema, hyperemesis, or elevated blood pressure. The colostomy was giving her no trouble. The patient fell into labor and was admitted to the hospital on July 30, 1933. The fetus lay in the transverse position and rotated so that the breech presented. This in part was doubtless a contributing factor to the prolonged labor of some twenty-four hours. Shortly after the rupture of the membranes, the cord prolapsed. Breech extraction was promptly performed because of fetal cardiac distress. The perineum offered little resistance and the skin and mucous membrane at the outlet remained intact. The child, a male, weighing 2,390 gm., was

asphyxiated, and despite efforts at resuscitation died after a few minutes. The puerperium was uneventful and afebrile. Four return visits to the postnatal clinic were made during the three-month interval following delivery, and pelvic examinations showed the uterus to be involuting normally, although it lay fixed in second degree retroversion. Some slight thickening was present on the left adnexal region just below the colostomy opening.

On Jan. 16, 1935, the patient again returned to the prenatal clinic and at this time was five months pregnant. Prior to her pregnancy, her menstrual cycle had been normal and her general health excellent. Varicose veins on the left lower leg caused some discomfort but there was no edema. Her pregnancy progressed without incident and on April 22, 1935, after an easy six-hour labor she was spontaneously delivered of a normal female child of 2,700 gm. The perineum remained intact. Examination of the patient at the time of this last admission to the hospital showed her to be in good physical condition. Vital signs were essentially normal. No masses other than the involuting uterus were palpable in the abdomen or pelvis when she was discharged. At this time she weighed 126 pounds. Laboratory findings: R.B.C., 3,850,000; W.B.C., 11,000; Hb., 12 gm. per 100 c.c. Urine negative for sugar and albumin. Stools guaiac negative. At the time of her last return visit to the postnatal clinic, three weeks after her delivery, the uterus was well involuted, but lay fixed in a retroverted position. A moderate-sized cystocele was present. The liver margin was not palpable. Aside from the uterus, no masses were discovered on abdominal or vaginal examination. The colostomy was functioning satisfactorily without recourse to catharties. The patient had no complaint whatever, and presented a picture of good health.

Comment.—The case reported shows an excellent postoperative recovery following an abdominoperineal resection of the rectum for carcinoma. The colostomy is giving good service and there is no evidence of recurrence of the tumor, four years after the operation. The patient has since delivered two children. The comparative ease of the last labor is probably to be explained on the basis of decreased perineal resistance following removal of some of the perineal and levator ani fasciae and muscles at the time of operation. It would, therefore, appear that, in certain selected cases, the female generative organs may well be preserved intact, at the time of radical removal of the rectum for carcinoma, with impunity as far as the reproductive functions are concerned.

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The authors report a case of peripheral neuritis and abortion occurring in a gravida iv while under therapy for reduction in weight with dinitrophenol. The toxicity of dinitrophenol is discussed with its causal relationship to neuritis and abortion.

W. B. Serbin.

A REPORT OF TWENTY-TWO LATZKO CESAREAN SECTIONS WITH A MODIFICATION IN TECHNIC

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ON THE fifteenth of November, 1927, the following case was admitted to my service at Grace Hospital:

Mrs. E. B., aged twenty-two, primipara, had been in labor four days at home under the care of a midwife. A number of vaginal examinations had been performed. Her membranes had ruptured at the outset of labor. Upon examination, the patient was found to have a normal temperature, and was moderately exhausted. She had a generally contracted pelvis; the position was L.O.P. with a floating head and marked overriding. A laparotrachelotomy with performed with no unusual findings and no difficulties were encountered with the exception of rather free bleeding due to uterine inertia. The patient left the operating room in good condition. Twelve hours after delivery she showed the typical signs and symptoms of a general peritonitis and died of this condition five days later.

Possibly better judgment would have been used if a Porro cesarean section or at least extraperitonealization of the uterus had been done, but the absence of evidence of real infection prior to operation led me away from these two rather drastic procedures.

This case brought home to me, however, the great need for a procedure which would eliminate the danger of causing peritonitis at the time of operation due to contaminating the peritoneum with spill.

In the June issue of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY of 1930, the two articles by Steele and Burns discussing indications, technic and results of Latzko section, appeared to me to be the answer to the problem.

Since that time it has been my privilege to perform twenty-two Latzko cesarean sections, which I wish to report at this time, with a slight modification in the technic as described by Burns which I have found helpful in this operation. All of these patients have been sufficiently exposed to contamination of the vaginal tract to make the possibility of peritoneal soiling a real one in the event of any intraperitoneal operation. With one exception, none of these patients was sufficiently infected as to warrant as radical a procedure as an extraperitonealization of the uterus or a Porro cesarean section.

The twenty-one cases which did not show gross infection are outlined in Table I.

TABLE I*

	DATE	NAME	AGE	GRAVIDA	INDICATIONS	MORBIDITY	NUMBER OF HOSPITAL DAYS
1	1/19/31	R. P.	18	i	38 hr. labor, membranes rupt. 2 days. Justominor pelvis with disproportion	2 days	14
2	4/18/32	E. DeF.	33	i	24 hr. labor. Breech. Markedly edematous cervix. Many vaginal examinations	1 day	15
3	8/17/32	M. V.	21	i	Seen after attempted high forceps; very marked Bandl's ring	5 days	14
4	7/19/33	E. S.	29	i	Uterine inertia. Cervical dystocia, membranes ruptured 30 hr. R.O.P. barely engaged	4 days	14
5	2/27/34	C. DelG.	21	i	4 days labor, rigid cervix. Many vaginal examinations	None	14
6	3/31/34	M. S.	33	i	Voorhees' bag induction for postmaturity. 48 hr. ineffectual labor, floating head	1 day	16
7	6/ 3/34	B. C.	30	iii	Generally contracted pelvis. 2 stillbirths. 8 hr. labor. No engagement. Examined vaginally	None	13
8	6/30/34	P. C.	28	i	Generally contracted pelvis with disproportion. Rupt. membranes 24 hr. 12 hr. of labor	None	13
9	7/30/34	A. C.	24	i	Generally contracted pelvis with disproportion. 14 hr. ruptured membranes. 18 hr. labor. Vaginal examinations	None	14
10	11/ 3/34	I. L.	22	i	24 hr. of hard ineffectual labor. R.O.P. in brim. 24 hr. of rupt. membranes. Many vaginal examinations	2 days	14
11	11/26/34	M. M.	27	i	48 hr. of labor. Cervical dystocia. Midwife case. Many vaginal examinations	2 days	12
12	2/12/35	I. C.	20	i	24 hr. labor. Membranes rupt.? No engagement, R.O.P.	2 days	14

*With the exception of Cases 4, 6, and 19, these patients were all seen late in labor in consultation or were brought into the Ward Service at Grace Hospital. Cases 4, 6, and 19 were from my private practice.

TABLE I—CONT'D

	DATE	NAME	AGE	GRAVIDA	INDICATIONS	MORBIDITY	NUMBER OF HOSPITAL DAYS
13	3/23/35	M. V.	21	i	Generally contracted pelvis with disproportion. Membranes rupt. 2 wk. 4 hr. of labor	None	14
14	4/25/35	E. M.	26	i	Cervical dystocia. 24 hr. labor. Membranes rupt. 24 hr. Head floating. Vaginal exams.	3 days	15
15	5/14/35	C. G.	26	i	Justominor pelvis with disproportion. 30 hr. labor with vaginal examinations	10 days	18
16	8/ 2/35	D. DeC.	25	i	36 hr. labor. 18 hr. 2nd stage with head barely engaged. Membranes rupt. 48 hr.	3 days	14
17	8/ 5/35	R. L.	23	i	40 hr. labor. No progress for 10 hr. with head barely engaged. R.O.P. Cervix 4 f. dilated. 9 vaginal exams.	None	14
18	8/16/35	T. S.	30	iii	2 normal deliveries of small babies. Generally contracted pelvis. Large baby. Absolute disproportion. 18 hr. labor with rupt. membranes. Patient was filthy dirty on admission and home sanitation very questionable	None	14
19	8/15/35	C. A.	32	i	40 hr. labor. 48 hr. rupt. membranes. Patient exhausted. No progress for 6 hr. R.O.P. Head well engaged but high. Cervix 4 f. dilated. Patient refused difficult vaginal delivery	None	14
20	8/27/35	M. D.	27	i	Borderline pelvis. 40 hr. labor. Unengaged Breech. Membranes rupt. at onset of labor. Many vaginal examinations	None	14
21	8/29/35	J. E.	21	i	Cesarean in interest of fetus. Premature partial separation of placenta. Membranes rupt. Unaccountable temp. of 102°. 20 hours labor	6 days	14

There was no mortality of either mothers or babies in the above series. Any temperature above 100.4° was considered morbidity, although the majority of rises in temperature were little more than the common postoperative rise during the first forty-eight hours after operation. The one case in which there was sufficient fear of infection to make a Latzko cesarean section seem hazardous but in which the condition of the patient did not warrant a more radical procedure is now presented.

CASE 22.—Mrs. E. G., gravida i, aged forty-one, was seen in consultation at New Haven Hospital. This patient had been sent into the hospital with a history of fetal death at term six weeks before. The findings on admission to the hospital were as follows: A very obese woman, weighing 270 pounds, having irregular labor pains with a term size fundus, vertex presentation without engagement, no fetal heart or movements. The vagina was very tight, the cervix high, admitting the tip of a finger. At the time I saw the patient, forty-eight hours had elapsed, during which time all attempts at induction with bougie and bag had failed. The cervix was rigid, admitting one finger. The patient was in very poor condition, showing signs of beginning cardiac failure. The pulse was 120, blood pressure 160/100. She was slightly cyanosed and dyspneic and was a very poor risk for any operative procedure. Latzko cesarean section was selected as the least shocking method of emptying the uterus without directly contaminating the peritoneal cavity.

The patient stood the operation well. Postoperatively she showed a severe colon infection of the wound with a direct sinus from the abdominal incision through the lower segment of the uterus and cervix which eventually closed. She had three days of morbidity and left the hospital on her fourteenth day postoperatively with the abdominal wound still draining. The wound eventually healed satisfactorily. The fetus was badly macerated.

The technic as described by Burns was modified in this series of cases as follows: Instead of filling the bladder before the initial incision, a retention catheter was placed in the bladder before operation. This catheter was connected to a graduated hypodermoclysis bottle filled with normal saline. The patient was then prepared and draped for operation. A suprapubic incision was made through the skin and fascia down to the bladder. The bladder was then distended to the desired point, usually about 300 to 400 c.c. of fluid being instilled. From this point Burns' technic was followed exactly.

The following accidents were encountered:

1. The peritoneum was opened in three cases: Once when Burns' warning not to cut the band extending from the fundus of the uterus to the left was not heeded, once when a previous suprapubic incision

had left the peritoneum adherent to the rectus muscle, and once for no obvious reason other than a very delicate peritoneum. In each case the rent was repaired and the operation continued.

2. The bladder was opened once, was immediately recognized and repaired. No retention catheter was used and no special care was given postoperatively as far as the bladder was concerned.

There were no untoward results in any of these cases and the patients made uneventful recoveries.

Certain points were noted in this series of cases:

1. These patients showed decidedly less shock and less postoperative disturbance than intraperitoneal cases in spite of the potential infection present.

2. The hospital stay was not lengthened.

3. The morbidity was certainly no greater than in other cesarean sections and not at all in proportion to similar cases in which laparotrachelotomies had been done.

4. The technic of operation, while definitely more difficult than either classical or low flap cesarean sections, is not sufficiently difficult to warrant its avoidance by a capable operator in any patient whose chances can be improved by the operation.

From this short series I have drawn the following conclusions:

1. Latzko cesarean section fills a very definite gap between the laparotrachelotomy and the more radical extraperitonealization of the uterus and Porro cesarean although in no way replacing these proceedings in their indicated cases.

2. The lack of shock and the smoothness of the convalescence warrant a widening of the indications for this operation.

I wish to express my deep appreciation to Dr. Arthur H. Morse for his constructive criticisms.

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Guthmann, H., and Neuhaus, W.: With What Certainty Does the Sedimentation Test Determine Inflammatory Disease of the Genitalia, Monatschr. f. Geburtsh. u. Gynäk. **98**: 157, 1934.

The authors performed 1,892 sedimentation tests on 1,138 patients to determine the value of this test in patients with inflammatory adnexa. Leucocyte counts were made at the same time, and it was found that the leucocyte count gave more reliable information in the acute stages whereas the sedimentation test was of greater value in the subacute and chronic states. Since the sedimentation test demonstrates changes for a longer period of time than the leucocyte counts, it is of greater benefit in cases of genital infections.

J. P. Greenhill.

LARGE INTRAMURAL CYSTS OF THE UTERUS WITH REPORT OF A CASE

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LARGE intramural cysts arising in the uterus and lined by true epithelium are rare. A search of the literature shows surprisingly few recorded cases. Most of the cases reported are in European periodicals. Much uncertainty exists concerning the origin and mode of production of these cysts. We have found no reports of such cysts in the American literature. This case is presented since it illustrates such a cyst; further interest is attached to the paucity of symptoms from it and its failure to complicate in any way the five previous pregnancies and the present one of the patient.

The patient was a negress, aged thirty-six years, first seen by me May 9, 1932, in the Out-patient Clinic of Duke Hospital. She was referred to me by her local physician, Dr. C. A. Flowers, of Wendell, N. C., for operation for a pelvic mass, thought to be either a fibroid or a cyst of the ovary. The patient asserted that she had not noticed any abdominal mass until the last three months. She had had no acute abdominal symptoms from its presence. There had been a "dull aching pain" in the left lower abdomen and a "feeling of heaviness" in the pelvis which had become gradually more marked during the past two months. There had been some frequency and urgency of urination during this same period of time. She had not menstruated since March 26, 1932, when she had a normal flow of six days' duration. Her previous period had occurred the early part of February, 1932, and lasted intermittently the entire month. Previous to this there were no menstrual irregularities. She thought that she might be pregnant, but was sure that there was "something wrong" in her pelvis. There had been no morning nausea or any other subjective symptom of pregnancy.

Family history contained no relevant facts.

Past history was that of good health and of an active life. She had had the usual childhood diseases without untoward sequelae. She had had a goiter since she was sixteen years of age; it had never caused her any symptoms; she believed it to be smaller than previously. She had had none of the acute febrile diseases; no accidents, injuries or operations. Review of systems was essentially negative.

Menses began at thirteen years of age and had always been normal in rhythm and in duration and amount of flow except as interrupted by her previous pregnancies. No unusual menstrual symptoms had been experienced.

Marital history: she had been married sixteen years; husband's health was good. There had been five uncomplicated pregnancies, parturitions and puerperiums; all five children were alive (ages: 12, 9, 7, 5, 2).

Physical examination: an undernourished, colored woman of 36 years in no acute pain. There was generalized scabies. Dental caries and loss of teeth were marked. The thyroid was symmetrically and moderately enlarged and somewhat nodular. No signs of hyperthyroidism were elicited. Heart was not enlarged; heart sounds normal; no murmurs; no thrills, rate, regular, 78. Lungs were normal to percussion

and auscultation; no râles heard. Breasts were normal; no secretion observed. Abdominal: there was a diastasis of about 2 cm.; abdominal wall strong otherwise. Inspection showed a mass which was chiefly confined to the left lower abdominal quadrant, but which extended also into the right quadrant but not as high on this side. The mass reached 15 cm. above the pubis on the left and in midline 10 cm. above the symphysis. It was not tender; felt very soft and cystic; there was no muscle spasm. No fetal parts could be outlined; no fetal heart sounds heard; uterine souffle was noticed. Pelvic examination showed moderate relaxation of the pelvic floor with old healed perineal tears. The levator muscles and perineal body were adequate. Vulvar glands and urethra were normal. There was a moderate sagging of the bladder base on straining down. Vaginal walls were clean and normal on inspection. The cervix was situated at the lower margin of the symphysis, was blunt, and softened and showed moderate ulceration and infection on speculum

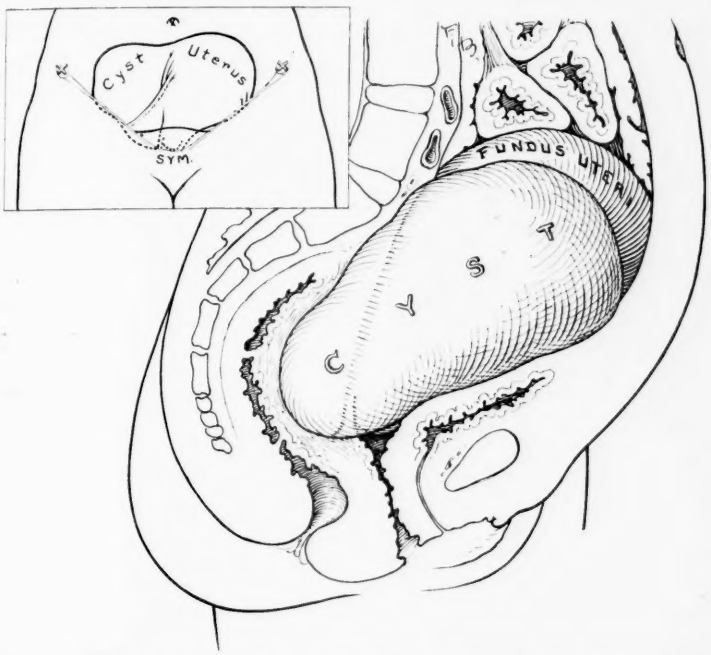

Fig. 1.—Diagrams showing the relative lateral, posterior, and inferior position of the cyst; note the displacement of the gravid uterus upward and to the left; (insert) the gravid uterus represented the greater portion of the abdominal tumor.

examination. Uterus, tubes and ovaries could not be outlined separately. The abdominal mass was continuous with a pelvic mass which filled the culdesac with considerable bulging of the posterior vaginal wall; this mass, as described, was situated chiefly in the left lower abdominal quadrant but in its lower abdominal and pelvic portions involved the right quadrant also. No areas of different consistencies could be made out. The mass was cystic, not tender, and fixed. Rectal examination added no additional information.

Weight 106 pounds; blood pressure 148/86; temperature 37° C.; pulse 78; and respiration 20. Laboratory findings: Hb 70 per cent; R.B.C. 4,470,000; W.B.C. 7,700; Wassermann negative; urinalysis: clear, yellow, acid, 1.016, sugar negative; albumin negative; 10-12 W.B.C. per high power field; 0 R.B.C.; 0 casts; sedimentation rate 3 mm. in first thirty minutes.

Diagnoses were: cystadenoma of left ovary; colloid goiter, scabies, and mild hypertension. Patient was admitted to the hospital for operation; basal metabolism rate and local treatment of scabies were done preoperatively. A Friedman pregnancy test was reported as positive. On this basis a diagnosis of early pregnancy and left ovarian cystadenoma was made. Basal metabolic rate determination was plus 3 per cent.

Operative Findings: Laparotomy, May 11, 1932, under spinal anesthesia, induced with 150 mg. of neocaine. The appearance of the pelvic tumor mass is shown diagrammatically in Fig. 1 with insert. The main left abdominal portion of the mass comprised a uterus containing a pregnancy of approximately two and one-half to three months. The right, posterior and pelvic portions of the mass were cystic; the pregnant uterus rested upon the cystic portion of the mass which filled the culdesac in such a way that the entire pregnancy was abdominal in situation with a portion of cervical canal also lying above the symphysis. There was no line of demarcation between the two portions of the tumor. Muscular coating of the cystic portion of tumor gradually thinned in the right, posterior and lower portions, and here the mass appeared quite bluish white and cystic. The tubes and ovaries which were normal had their usual anatomic location as referred to the pregnancy portion of the tumor; the cyst was associated intimately with the pregnant portion in its right lateral, fundal and posterior portions, the right tube, round ligament and ovary lying anterior to the cystic portion. The left ovary contained the corpus luteum of pregnancy. A supravaginal hysterocystectomy was done. Routine pelvic repair and reperitonealization and closure were done. Patient stood the operation well, made an uneventful recovery and was discharged from the hospital April 23, 1932. A postoperative visit from the patient on July 18, 1932, and subsequent reports from the doctor indicated an uncomplicated convalescence and return to duty.

Pathology Report.—(Dr. R. H. Rigdon) *Gross examination:* (See Figs. 2 and 3). The specimen consisted of uterus with a cystic mass which was a part of the fundus of the uterus. The uterus had been amputated near the internal os. The uterus and cyst measured 22 cm. in its greatest diameter. The uterus had a diameter of 8.5 cm. while the greatest diameter of the cyst was 13 cm. There were a few fibrous adhesions over the uterus and the cyst. There was no definite line of demarcation between the cyst and uterus. There was only an increase in the diameter of the cyst as it originated from the uterine wall. The round ligament on the right side apparently had its origin from the junction of the cyst with the uterus.

Both fallopian tubes have been sectioned near the body of the uterus. The uterus is somewhat soft in consistency and normal. On section the cyst is filled with a straw-colored fluid and in the uterine cavity there is also a small amount of straw-colored fluid which is amniotic fluid. Here we find a normal pregnancy which is approximately two and one-half months. The uterine cavity measures 6 cm. in diameter and the findings here are those of a normal pregnancy. The vessels in the wall of the uterus are dilated. It is of interest to note that there is a continuation of the myometrium from the uterine wall into the wall of the cyst. This can well be traced for a distance of 7 to 8 cm. in the wall of the cyst. The thickness of the wall between the uterine cavity and the cystic cavity is 6 mm. The greater portion of the cystic cavity is relatively smooth there being in one area a large fibrous band 1.5 cm. by 3 mm. which extends across the cyst at a point 4 cm. from the fundus of the cyst. There is another band of adhesions which measure 1.5 cm. in thickness which forms a shelflike projection in the inner surface of the cyst. The wall of the cyst in the portion distal to the uterus is transparent. Numerous small blood vessels can be seen to radiate over the inner surface of the cyst. Approximately half of the cyst adjacent to the uterine cavity has a granular appearance.

Microscopic Examination.—The section shows a portion of the wall of the uterus in the area of the uterine cavity and the large cyst. In the area of the endometrium there are decidual cells. Many of the endometrial glands are greatly dilated while

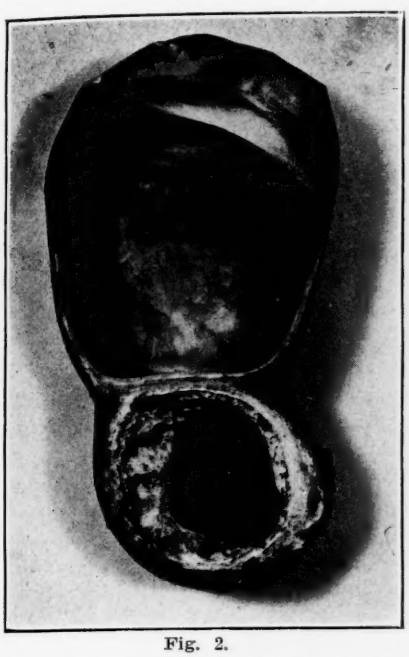

Fig. 2.

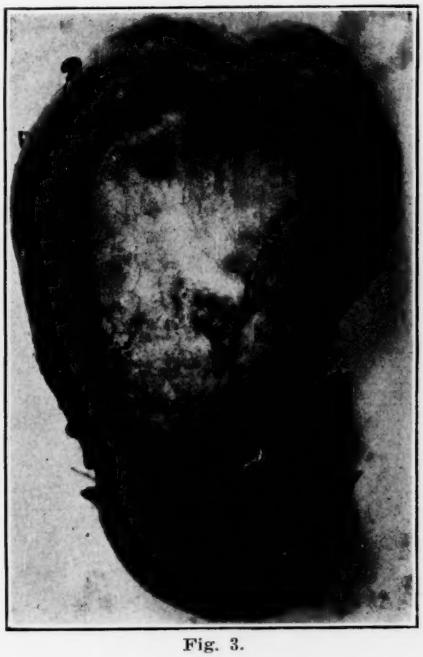

Fig. 3.

Fig. 2.—The inner surfaces of cyst and gravid uterus.

Fig. 3.—The posterior surface of the tumor mass. The stump of cervix is shown at the left lower margin. Portions of the right tube and round ligament are visible at right upper margin. Photograph is made from formalin-fixed specimen and the resulting distortion gives an imperfect idea of the inferior portion of the cyst which filled the culdesac. Diagrams in Fig. 1 give a better idea of topography.

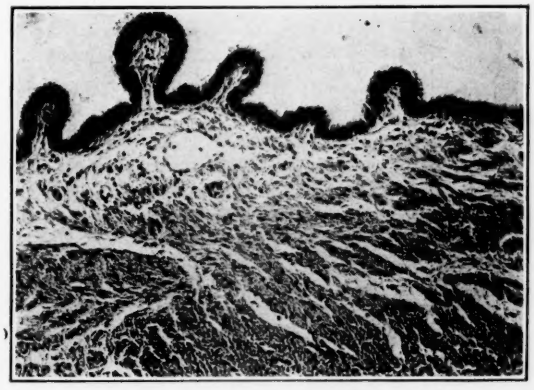

Fig. 4.—The epithelial lining of the cyst showing small papillary-like projections into the lumen (×120).

few of the endometrial glands appear relatively normal. Few mononuclear cells and leucocytes are present in the stroma of the endometrium. Many giant cells are present in portions of the stroma. Few chorionic villi are also present. Many of the blood vessels of the myometrium are dilated. The cyst is lined by a single

layer of columnar epithelium. At many points along this epithelium there are small papillary-like projections into the lumen of the cyst (Fig. 4). The muscular tissue present in this portion of the cyst wall corresponds exactly to that in the wall of the uterus. It is of interest to note that as one proceeds along the wall of the cyst from the uterus the amount of muscular tissue decreases and the amount of stroma between the muscle bundles increases.

DISCUSSION

Cysts may occur subperitoneally or in the endometrium or myometrium. Haarbleicher[1] who reviewed the literature prior to 1910 on intramural cysts found only 11 cases and added notes on 3 additional ones which had been reviewed. Of these only 3 perhaps were suggestive of congenital origin. There are many views as to the origin of the congenital cysts: from the wolffian body (Recklinghausen[2]); from Gartner's ducts (Rieder[3]); from müllerian ducts (Kossman[4]); from epithelium of endometrium (Chiari[5]); from endothelium of peritoneum (R. Meyer[6]); from lymphatic canaliculi (Blount[7]). Acquired ones may arise from inflammation (R. Meyer[6]); from accidental implantation and traumatism (Risch[8]) or in the course of the regeneration of the endometrium after delivery (Recklinghausen[2]). Aschoff[9] notes the general origin of cysts is from the absorption of necrotic tissue, from dilatation of preexisting cavities, and from neoplastic processes with closed cavity formation. Many of the acquired cysts of the uterus originate as a result of cystic degeneration of fibromyomas and adenomyomas (Cullen[10]).

We shall limit this discussion to a consideration of intramural cysts, omitting those of the cervix, subperitoneal and endometrial ones and those as a result of degeneration of fibromyomas or adenomyomas.

Intramuscular cysts may occur in any portion of the body of the uterus, in the cornual portion, near the fundus, or in the isthmus. As a rule these cysts are quite small and many are found only in the course of routine pathologic studies after operations or autopsy. These cysts may reach large size and require laparotomy, the preoperative diagnosis being usually, ovarian cyst or fibromyoma. Rosenthal[11] reports an instance in which the cyst attained the size of a term pregnancy. Large cysts have been reported also by Ottow,[12] Fukushima,[13] Pribram,[14] Dworzak,[15] Fink,[16] Knauer,[17] Breus,[18] Amos,[19] v. Arx,[20] Frankl,[21] v. Jaschke,[22] Küstner,[23] Stübler,[24] Haarbleicher,[1] Stufler,[25] Candelet,[26] Péan.[27] In none of these instances was the diagnosis made preoperatively. The majority of these occurred in women in the fourth and fifth decades of life. The period of duration of symptoms from these tumors was relatively short: three to nine months in the majority of instances. The only symptoms which were attributed generally to the cyst were lower abdominal enlargement and pressure on adjacent viscera. None of these cases was associated with pregnancy or recent pregnancy.

Due to the rarity of these cysts, no one individual has had the opportunity of studying more than two or three specimens, and therefore, our knowledge as to their character is quite imperfect. The origin of these cysts is the chief point of contention. Haarbleicher[1] notes: "A sufficient number of these cases have not yet been reported to confirm the many theories of possible origin. The origin from Gartner's canal appears to have at present the most cases in support of it." The work of Recklinghausen,[2] Rieder[3] and others has shown the persistence of Gartner's canal. Wolff[28] says that Rieder found residual Gartner's ducts in 30 per cent of uteri examined and R. Meyer in 22.2 per cent of the cases. There is much doubt as to the persistence of the wolffian body in the uterine wall; Robert Meyer[6] does not believe that there occurs any such remains; Frankl[21] is of the same opinion and states that a glandular tumor in the middle of the fundus can never arise from

embryonal kidney tissue. Frankl further states that the only criterion in judging the origin of these cysts is their embryonal-topographic relationship. He emphasizes the origin of certain of these cysts from the müllerian duct and its derivative, the uterine mucosa. He notes that Robert Meyer, Ferroni and Maudach have found in the uterus epithelial islands which originate from the müllerian ducts; the location of these in midline is explained by Robert Meyer as due to the ducts meeting here "a difficult terrain on penetration of the mesenchyme." Frankl considers that the point of union of the two ducts offers many opportunities for embryonal rests; particularly due to the primary invaginations of the walls. Frankl, Dworzak,[15] Stübler,[24] and Ottow[12] consider the cysts reported by them as originating from the müllerian ducts.

Due to the lateral course of the wolffian ducts, cysts which arise from the lateral or cornual portion of the uterus or above the insertion of the round ligament suggest origin from the rests of Gartner's ducts. Those which arise from the mesial portion of the uterus may have as their source remnants of the müllerian ducts or glands of the endometrium.

The epithelium lining of these cysts may vary considerably; it may be ciliated or nonciliated columnar, pavement epithelium or may not be demonstrable. In some cases as reported by Mercadé[29] and Amann,[30] the epithelium may show slight projections into the cavity, papilliform in type but Haarbleicher[1] thinks this probably is due to the section passing through a fold or curve of the cyst wall, as so commonly happens in curettings. Our case showed areas of such configuration. None of the reported cases reviewed showed any malignant changes in the cyst wall.

In our case, the attention of the patient to the mass was the result, no doubt, of the enlargement of the pregnant uterus which was pushed out of the pelvis by the cystic portion; no doubt, had not the menses been irregular she would have considered herself pregnant and sought no medical attention. Therefore, her symptoms were of a duration equivalent to the onset of the pregnancy. The duration of the tumor is uncertain as we have no record of any previous pelvic examination: her deliveries were under the care of a midwife. The absence of any complications from her previous pregnancies can probably be explained by the upper uterine origin of the mass with the result that in the course of labor the cystic portion of the uterus was brought into abdominal location and did not tend to block the entry of the presenting part into the pelvis. This might well have happened in the pregnancy interrupted by operation. In the pregnancy found at this operation, the placenta will be seen to have a safe attachment away from the cystic portion of the uterus. The wall of the uterus in relation to the cystic portion is strong and one would not suspect weakening of it to such an extent that spontaneous rupture or rupture in the course of labor might occur.

The pathologic studies and operative findings would lead us to believe this cyst to be of congenital origin. Due to its broad, fundal and medial location, one is inclined to believe that it probably originated from rests of the müllerian ducts.

SUMMARY

We report a large intramural cyst of the uterus occurring in a negress, aged thirty-six, who was about two and one-half to three months pregnant at the time of operation. Five previous pregnancies, parturitions and puerperiums were uncomplicated. The literature of previous cases has been reviewed and the theories of etiology and pathology are discussed. The reported case is thought to be of congenital origin, probably arising from rests of the müllerian ducts.

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CERVICAL CARCINOMA IN A GIRL OF SIXTEEN YEARS*

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THE literature on this subject discloses a very small number of patients below twenty years of age with carcinoma of the cervix, especially if there has been no pregnancy. The percentage of cases of carcinoma of the cervix in nulliparous women is variously given as 2 to 8 per cent. In studying the reports of carcinoma of the cervix in patients of twenty years of age or younger, and especially in children, various authors question the diagnosis of carcinoma, in many cases considering the growth as a teratoma or sarcoma rather than carcinoma.

The literature was reviewed by Bonner in 1927, Morse in 1930, and Baldwin in 1931, with report of a case by Bonner and one by Morse. During the forty-eight years which these reviews covered, there were reported but six authentic cases of carcinoma of the cervix in individuals between the ages of sixteen months and fourteen years and 7 cases between the ages of sixteen and twenty years.

The patient, white, aged sixteen, was referred to me by her family physician Jan. 7, 1930. For six months there had been a dark brown bloody vaginal discharge that was present almost constantly though scant in amount. There had been slight pain in the lower abdomen and pelvis and some burning in the vagina.

*Read at a Meeting of the Pittsburgh Obstetrical and Gynecological Society held April 8, 1935.

The menses began at the age of eleven, at intervals of thirty to thirty-five days, and continued for four or five days. The flow was not excessive at any time, but there had been a slight increase in the past six months. Some pain was experienced the first day, yet she was never confined in bed.

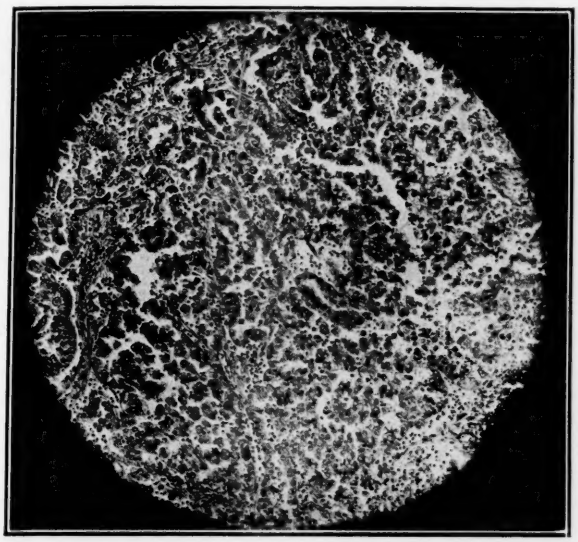

Fig. 1.—Low-power photomicrograph showing glandular formation of the neoplasm and the sparse fibrous supportive stroma.

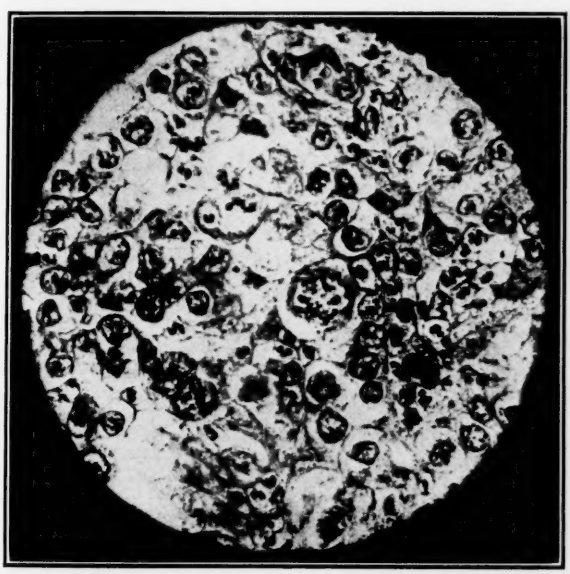

Fig. 2.—High-power field of the tumor revealing rounded cells with large vesicular nuclei, multiple large nucleoli, and atypical mitotic figures.

The patient had influenza at the age of nine years but made a good recovery. She had always had good health, and there was no history of chronic or malignant diseases in her family. The patient was well developed and well nourished. Her

weight was 128 pounds and her height was 5 feet 5 inches. She did not know of any loss of weight since the beginning of the bleeding. Her color was fairly good. The abdomen was not distended. Palpation revealed tenderness just above the pubes, but no mass was demonstrable. R.B.C. 3,900,000, W.B.C. 9,500, and Hb. 76 per cent. The Wassermann test was negative.

Though vaginal examination at the office was unsatisfactory, several pieces of tissue from a soft friable intravaginal growth were secured. The pathologic examination was made by Vandergrift who diagnosed the condition as adenocarcinoma of the cervix.

The patient was admitted to the Columbia Hospital Jan. 8, 1930. Vaginal examination, under anesthesia, was done the following day. A soft, friable mass filled the upper half of the vagina, and the entire circumference of the cervix was involved, the right side to a greater extent than the left. The portion of the growth of the left side was firmer than that of the right side. Upon manipulation the mass bled considerably. The uterus was a little enlarged and situated in the long axis of the body. The tubes and ovaries were not palpated.

Operation was performed as follows: The cervical opening was dilated and the uterus curetted. No curettings were obtained. Three portions of tissue were removed from the cervical growth for laboratory examination, following which the remainder of the cervix was amputated by cautery. At this time 3160 mg. hours of radium were used. X-ray treatment was instituted three weeks later at the Westmoreland County Hospital.

Pathologic report by Dr. Vandergrift:—The sections showed a fibromuscular structure with epithelial masses invading one side. The cells were large, and vesicular nuclei were arranged in small masses. Some of these masses were isolated in the fibromuscular tissue. Others showed numerous massed columnar glandlike structures with only a very scant stroma and a few capillaries. These glandlike structures were not definitely outlined and the cells were not arranged in an orderly manner. Many mitotic figures were seen. *Diagnosis:* Adenocarcinoma of cervix. A section of this specimen was also examined by Dr. Haythorn at the Singer Memorial Laboratory.

Five months later the patient received 1425 mg. hours of radium application and following that she was reexamined at intervals of two or three months for the next eighteen months. Nine months after the operation there was slight bleeding from the vagina following examination, but there was no evidence of recurrence of the growth. Eighteen months after the operation the patient complained of some discomfort in the rectum. Examination revealed a small reddened area on the anterior aspect of the rectum about an inch from the anal orifice. Subsequent examination at a later date showed no evidence of any inflammatory process of the rectum but there was some perianal pruritis.

The second year after operation the patient had a moderately severe attack of cystitis and pyelitis on the left side, which lasted intermittently for two months. Six months later another attack of cystitis developed, which was mild and of short duration. The patient reported for reexamination every three to six months during the years 1932, 1933, and 1934. May 27, 1933, there was a slight amount of nonsanguineous mucoid discharge from the vagina. The uterus was normal in size and was partially fixed. There was induration along the left broad ligament and a lesser amount of induration posterior to the uterus. The inflammatory process was quite well absorbed within three months. July 4, 1933, menstrual periods were resumed, occurring every twenty-eight days, with excessive bleeding on two occasions. Two periods were prolonged.

The patient's last visit was on Feb. 2, 1935, a little over five years since treatment was instituted. She weighed 131 pounds, and appeared in excellent health. On examination the uterus was found to be small. There was some constriction of the left vaginal vault and slight induration to the left and posteriorly. The patient reported that there was some prolongation of the menstrual period in January, 1935, but that the total amount was not excessive.

SUMMARY

1. The paucity of cases among earlier authors and the increasing number reported at the present time emphasizes the necessity for more prompt recognition and reporting of such cases.

2. Because of the admitted high mortality rate of carcinoma cases among the young every available method for thorough treatment was employed.

3. The amount of the initial dose of radium utilized was smaller because of the anatomic proximity of the bladder, urethra, and rectum. With this in mind the danger of an ensuing fistula between these structures and the vagina had to be considered.

REFERENCES

(1) *Bonner, Adolph:* Am. J. Obst. & Gynec. **14**: 175, 1927. (2) *Morse:* Am. J. Obst. & Gynec. **19**: 520, 1930. (3) *Baldwin, L. G.:* Am. J. Obst. & Gynec. **21**: 728, 1931.

CHORIOMA (CHORIOADENOMA TYPE)*

Joseph J. Mundell, M.D., Washington, D. C.

Mrs. T., aged twenty-five years, married five years, never pregnant. Menses were always irregular, usually every thirty-five days but often missing one or two months, occasionally three or four months.

Present illness.—Last normal menstruation began May 6, 1934. Beginning June 20 there was a scant light brown vaginal spotting following micturition. This recurred for a day or so at a time, every few days. She was put to bed on July 8 because of bleeding which increased in amount until July 16, when she aborted. On July 15 an Aschheim-Zondek test was positive. Patient says that on July 16 she passed a sac and that twelve hours later there was a hemorrhage and the following day she passed a large mass having the appearance of fish roe. Free bleeding in spite of ergot, etc., continued until her admission to Providence Hospital, August 17.

Examination revealed a soft patulous gaping cervix and a slightly enlarged soft boggy fundus. On August 18 under gas anesthesia retained secundines were removed. The pathologic report of the moderate amount of material removed stated that it consisted of numerous blood clots, laked blood, collection of red blood cells, degenerated fragments of tissue with the morphology of chorionic villi, and pieces of endometrium. Scattered throughout the hemorrhagic tissue, in certain sections, are sheets of fairly large ovoid, pale staining cells with granular cytoplasm, which are typical decidual cells. There are also collections of deeply staining cells, some of which have formed multinucleated masses. There are other smaller collections of cells which are larger in size, and with large, pale, vesicular nuclei. These collections of cells are prominent in the regions showing the degenerated, hyalinized villus-like tissue, and are hyperplastic syncytial, and Langhans' cells.

*Presented at a meeting of the Washington Gynecological Society, January 26, 1935.

The endometrium, besides the decidual section, shows considerable hyperplasia. The glands are lined by several layers of cells, and show peg formation, and secretory activity. The endometrium shows no invasion by hyperplastic syncytial, and Langhans' cells.

Pathologic Diagnosis.—Placental tissue (pregnancy).

The patient seemed to make a satisfactory convalescence from the curettage and was discharged from the hospital on August 23. However, on the morning of her discharge she complained of nausea which grew progressively worse after her return home until it ceased suddenly following a profuse uterine hemorrhage, August 26. More or less constant bleeding, at times profuse, continued until readmission to the hospital, August 31.

Upon examination at this time the uterus was found to be somewhat larger than at the time of the first curettage. The patient's general condition showed evidence of the blood loss; hemoglobin 50 per cent, red cells 2,250,000.

At curettage, September 1, a large quantity of scrapings was obtained showing a very active degeneration and resembling somewhat a hydatidiform mole. The following is the pathologic report of these scrapings:

"This specimen consists of numerous small irregular dark masses. Sections show decidual tissue in which there are papillary structures resembling chorionic villi. The stroma is myxomatous. The epithelium in some areas is quite regular, in others the Langhan cells are seen undergoing rapid division with many mitotic figures. In some areas they appear in solid nests. It is evidently a malignant chorioma of the chorioadenoma type."

September 2 the temperature rose to 104° F. but was normal on September 3, when a blood transfusion was given and laparotomy was performed on September 4, when the entire uterus with both tubes and ovaries were removed.

Macroscopically before the specimen was incised the appearance of the tissues was perfectly normal. However, upon incising the fundus it was seen to be literally honeycombed with the infiltrating degenerating growth.

The pathologic report of these structures is as follows:

"Sections of the uterus show a similar choriocarcinoma as described in the diagnostic curettement. There are numerous strands of large irregular cells between the muscle bundles. Many show mitotic figures. There is also some granulation tissue. The ovary contains numerous small simple cysts and corpora albicantes."

On the second postoperative day the temperature rose to 104° F., rapidly receding to normal on the fourth day where it remained until her discharge, September 19, when her general condition was satisfactory.

Before her discharge from the hospital she received a course of deep x-ray therapy, four treatments of 200 kilovolts each.

Aschheim-Zondek tests October 26, November 25, and December 24 were all negative.

On November 30 bimanual examination revealed the vault of the vagina to be freely movable, there being no evidence of any induration in the pelvis nor evidence of new growth on the vaginal mucosa. In December, 1935, there was still no evidence of recurrence and the general condition was excellent.

COMMENT

This case merits reporting first, because of the rarity of the condition; second, because of its early recognition, and third, because of its apparent cure. As to the latter, naturally, it is much too early to make any prediction as to the outcome, though the negative Aschheim-Zondek tests are encouraging.

1616 Rhode Island Avenue, N. W.

Society Transactions

WASHINGTON GYNECOLOGICAL SOCIETY

Meeting of January 26, 1935

The following papers were presented:

A Study of the Postnatal Clinic of Columbia Hospital Out-Patient Department. Dr. Joseph Harris.

Abdominal Pregnancy. Dr. W. R. Thomas.

Acute Puerperal Inversion. Dr. J. B. Jacobs.

Chorioma (Chorioadenoma Type). Dr. J. J. Mundell. (For original article, see page 539.)

Item

American Board of Obstetrics and Gynecology

The next written examination and review of case histories of Group B applicants for certification by this Board will be held in various cities of the United States and Canada on Saturday, March 28, 1936.

The oral, clinical and pathological examination of all candidates for certification by this Board will be held in Kansas City on Monday, May 11, and Tuesday, May 12, 1936, immediately prior to the scientific session of the American Medical Association. Applications for Group A candidates must be received not later than April 1, 1936.

The annual informal dinner and general conference of Diplomates attending the American Medical Association convention will be held at the Hotel Kansas Citian, Kansas City, Missouri, on Wednesday, May 13, at 7:00 P.M. At this dinner the successful candidates from the examinations of the two preceding days will be presented in person, and short addresses will be made by two members of the Board and two invited guests.

For further information, booklets, and application blanks, apply to the Secretary, Dr. Paul Titus, 1015 Highland Building, Pittsburgh (6), Pennsylvania.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D.

Selected Abstracts

Gynecologic Operations

Brocq, P., and Du Peaux, B.: New Statistics on the Le Fort Operation. Results in 14 Cases of Closure of Vagina for Complete Genital Prolapse Among Old Women, Bull. Soc. d'obst. de la gynéc. **24:** 128, 1934.

The authors were able to trace 10 out of 14 women who had had a Le Fort operation for complete prolapse and found that only one had had a recurrence, two years after the operation. Since 1932 the authors have performed this operation combined with a posterior perineorrhaphy under spinal anesthesia. There have been no operative deaths. The authors collected reports of a total of 360 Le Fort operations. In this large number there were only 28 failures due in a large part to faulty technic. The authors advise against complete hysterectomy in cases of complete prolapse because this carries a mortality of 10 per cent and causes several complications. They likewise are opposed to Watkins' interposition operation and believe that the Le Fort operation possesses advantages over all other types of operations.

J. P. GREENHILL.

Frei, J.: Experiences With the Interposition Operation of Schauta-Wertheim, Monatschr. f. Geburtsh. u. Gynäk. **96:** 135, 1934.

In Frei's clinic the interposition operation is the procedure of choice for cases of descensus of the uterus and vagina. Of the 242 operations performed in the clinic, 41 per cent were for cases of descensus, 37.5 per cent for cystocele, 7 per cent for cystocele and rectocele, 11 per cent for partial prolapse and 3.5 per cent for outspoken prolapse. In three cases the bladder was accidentally torn. In all cases, inhalation anesthesia was used. In 139 women who were still in the childbearing age, sterilization was carried out by means of the Madlener-Walthard method. There was not a single death in the entire series. Sixty-four patients were reexamined after operation and entirely satisfactory results were observed in 62 of them. The author emphasizes that the interposition operation is excellent for descensus of the uterus and vagina and for cases of cystocele but not for cases of total prolapse.

J. P. GREENHILL.

Ahltorp, G.: Results of Prolapse Operations, Acta obst. et gynéc. Scandinav. **13:** 368, 1934.

The author attempted follow-up examinations on 104 cases of prolapse operated upon in the Upsala Academic Hospital Gynecological Clinic from 1924 to 1931.

He gives a detailed account of the operative method consistently employed, namely, anterior colporrhaphy and colpoperineorrhaphy with high levator suture, in some cases combined with amputation of the cervix.

Of the 104 cases 95 were subsequently examined, on an average of 4 years and 7 months after the operation. Of these 95 patients 86 (90.5 per cent) were completely cured, 2 improved, and 7 (7.4 per cent) not cured. Of 76 patients actually examined long after operation, 70 (92 per cent) were found completely cured, 1 improved, and 5 (6.6 per cent) not cured.

Six patients were delivered after operation, 11 times in all. Prolapse recurred in 2 of these.

A study of these cases leads the author to the following conclusions: Amputation of the vaginal portion of the cervix may cause premature labor in subsequent pregnancies. Labor after a plastic operation on the pelvic floor will not be appreciably longer than normal. Careful supervision during labor, particularly when the head has reached the pelvic floor, and early, extensive perineotomy are essential. If necessary, outlet forceps should be employed.

Anterior colporrhaphy and colpoperineorrhaphy, combined if necessary with amputation of the vaginal portion of the cervix, provide a very high degree of fulfilment of all reasonable demands made on the operative treatment of prolapse, as it relieves the patient from distress; it is practically without risk; its technique is easy; and it leaves the patient's genital functions absolutely unimpaired.

J. P. GREENHILL.

Müller, W.: Pulmonary Embolism After Gynecologic Operations, Monatschr. f. Geburtsh. u. Gynäk. **95**: 153, 1933.

At the Hamburg Woman's Clinic between 1919 and 1931 the mortality from postoperative pulmonary embolism was 0.6 per cent greater than it had been previously. The type and duration of operation play a rôle. Most emboli occurred after operations for carcinoma and myomas. Age also is a factor as are also disturbances in the circulatory system. Müller could not detect that narcosis had any evil effect. Most of the emboli occurred during the fall and winter months. The Trendelenburg operation was performed 3 times without any success. Most deaths from emboli are due not to choking but to disturbances in the heart. All the fatal cases showed abnormalities in the heart and blood vessels. Hence prophylactically and therapeutically the author advocates heart stimulants, but he warns against the use of quick-acting cardiac stimulants such as adrenalin in order to avoid further thrombosis. The latter is treated by bed rest and elevation of the affected extremity. Respiration is stimulated by exercise, oxygen and carbon dioxide. Most thromboses also were observed in the fall and winter months.

J. P. GREENHILL.

Lifvendahl, R. A.: Gonococcal Laparotomy Wound Infections, Am. J. Surg. **21**: 123, 1933.

From a review of the literature it is evident that the skin and subcutaneous tissues are not the most suitable soil for the development of gonococci. Lifvendahl reports a case in which an abdominal wound was infected by this organism. The supravaginal portion of the uterus, both tubes and ovaries, and the appendix were removed. After the intraabdominal surgery was completed, clean instruments, gloves, and linen were used in order to prevent infection being carried from the

pelvis to the edges of the wound. Microscopic examination showed a fibrinopurulent exudate on the surface of the appendix, ovaries and tubes, the latter containing a purulent exudate which was also present between the circular muscle bundles. The postoperative course showed a decreasing temperature, 102° to 99° F., with a concomitant decrease in pulse rate. On the seventh postoperative day the temperature rose to 102.2° F. Examination of the wound on this day revealed no discoloration or abnormal tenderness, but when two sutures were removed, and the lower end of the median incision opened a large amount of pale brownish, pea souplike liquid escaped. Smears and cultures revealed morphologically and culturally characteristic gonococci. Undermining for a distance of from 1 to 2 cm. on each side of the lower 2½ cm. gap was elicitable on the twelfth postoperative day, but the underlying fascia was intact. These two openings communicated with each other. The complement fixation test for gonorrhea was positive. The wound was completely healed on the forty-second day. No pus was obtained from either the urethral or labial glands.

J. T. WITHERSPOON.

Marchese, F.: Thrombophlebitis and Emboli Following Gynecological Operations, Folia Gynaec. demograph. **31:** 529, 1934.

From a very exhaustive study of literature the author finds that the incidence of thrombophlebitis and emboli is less frequent in patients who are allowed out of bed early and who are made to exercise postoperatively.

He reports on the incidence of emboli in the larger clinics and finds the variation from 0.1 per cent to 5.2 per cent. The author had an incidence of 0.16 per cent in 96 cases.

MARIO A. CASTALLO.

Bernardberig, J.: Uterine Perforation Occurring During Curettement, Bull. Soc. d'obst. et de gynéc. **24:** 260, 1935.

The author reports a series of perforations of the uterus which occurred during the course of curettage. He points out that some physicians always intervene for this accident, others abstain from operation, and a third group select the cases for the course they intend to follow. He emphasizes that in some instances malformations of the uterus are responsible for this accident. In some cases where there is doubt as to the occurrence of a perforation he suggests that lipiodol be injected into the uterus.

J. P. GREENHILL.

Daniel, C.: The Surgical Treatment of Tuberculosis of the Female Genitalia, Gynéc. et obst. (Bucarest) **11:** 1933.

In a series of 266 chronically diseased fallopian tubes removed at operation Daniel found tuberculosis in the removed tissue 38 times (10.7 per cent). Among these 38 cases, the tuberculous process was found in the tubes 31 times, in the uterus 2 times, and in the uterus and tubes 5 times. A radical operation was performed in two-thirds of the cases, a conservative operation in 13 per cent and simple laparotomy in 19 per cent. In one-fourth of the cases, the intestines were damaged during the course of the operation. All the patients recovered but four fecal fistulas developed. The author followed up 21 patients and found that 17 had been cured definitely, 3 were relieved, and 1 patient died.

J. P. GREENHILL.

Wolf, O.: The Operative Treatment of Adnexal Tumors, Monatschr. f. Geburtsh. u. Gynäk. **100:** 41, 1935.

At the Kiel Clinic, Wolf observed 275 operations for large adnexal tumors. In this series 56 had acute infections and 25 per cent of the women died. There was a second group of 75 cases which could not be cured by conservative measures. Here there was a tendency to recurrences in the form of ovarian abscesses. The mortality in this group was 8 per cent. In the final group of 144 cases operation was performed only for local disturbances. In this group gonorrhea was the etiologic factor in 35 cases, septic processes in 44 and tuberculosis was present in 11 cases. The death rate in this group was only 2 per cent.

The author emphasizes that in cases of adnexal tumors there is no single type of treatment. Neither etiology nor morphology nor pathogenesis, can solely determine appropriate treatment. We must depend upon the entire clinical picture for our course of action.

J. P. GREENHILL.

Siegmund, H.: Ovarian Function Following Hysterectomy, Arch. f. Gynäk. **157:** 223, 1934.

Siegmund performed hysterectomies on 40 rabbits and studied the ovarian function for periods up to one year following the operation. He found that ovulation went on undisturbed. Maturation of the follicle, and ovulation and corpus luteum formation are apparently unaffected by removal of the uterus. He therefore concludes that the uterus plays no rôle in the normal sequence of ovarian function.

RALPH A. REIS.

Pavlenko, S. M.: Experimental Data on the Question of Transplantation of Ovaries, Vestnic Endocrin. (Moscow) **4:** 283, 1934.

For experimental transplantation of ovaries the place to which the ovary is transplanted plays a very insignificant rôle.

In regard to physiologic effect of auto- and isotransplantation of ovaries, it seems that they are equivalent in qualitative and quantitative respect. Heterotransplantation of ovaries has less effect than auto- and homotransplantation.

Transplantation of ovaries to the castrates does not return the sexual cycle peculiar to normal females, but produces prolonged uninterrupted estrus, which depends, as it seems, in the first place on breaking the connection of the ovaries with the nervous system.

Prolonged state of castration sharply decreases the percentage of successful results after the transplantation of ovaries.

ALEXANDER GABRIELIANZ.

Cheval, M.: Ovarian and Uterine Grafts, Bruxelles-méd. **14:** 1138, 1934.

The ovarian graft, when the uterus is left in place, is certainly useful. However, after hysterectomy the ovarian grafts are not useless but their activity will be diminished by the destruction of ovarian tissue due to atretic phenomena. The uterine graft is realizable under aseptic operative conditions. It brings about in the ovaries luteinization of the atretic follicles. It seems that the uterine grafts better ovarian conservation, and that these grafts help to continue ovarian activity after hysterectomy.

J. THORNWELL WITHERSPOON.

Mayer, L.: Ovarian and Uterine Grafts, Bruxelles,méd. **14:** 1170, 1934.

Autogenous ovarian grafts ought to be used routinely in all women under fifty years of age who have had bilateral oophorectomy. It is important to preserve in these grafts fragments of the surface of the ovary in order to maintain the germinal epithelium and a bed for the primordial follicles. In the case of hysterectomy in women under forty years of age it is useful to add a uterine graft to the ovarian graft. This uterine graft tends to continue the uterine-ovarian hormonal relations and ovarian activity.

J. THORNWELL WITHERSPOON.

Hall, James S.: Cyst Formation in Ovarian Grafts, Lancet **2:** 227, 74, 1934.

The reports of cyst development in extraperitoneal ovarian grafts are few. Heretofore 10 cases have been reported; the author's case totals 11. Ordinarily the grafts are placed in the abdominal wall. The amount of tissue that lives is variable.

All but two of these cysts were simple follicular ones. These two exceptions contained blood and showed lutein change. The explanation offered for these changes is that there is not the usual method whereby absorption may take place should graafian follicles rupture.

When cysts in transplanted ovarian tissue occur, removal is the best treatment. Extraperitoneal implantation in selected cases is simple and free from danger. So far there are no recorded reports of malignancy.

H. CLOSE HESSELTINE.

Freund, R.: Brenner Tumors, Arch. f. Gynäk. **155:** 67, 1933.

Freund found two Brenner tumors in one year in the material at the Charite in Berlin. The tumor was a large pseudomucinous one in the first patient and belonged to Group 2 of Meyer's classification. The second patient had a panhysterectomy for adenocarcinoma of the uterus and a small single isolated solid nodule was found in one ovary. This belonged to Group 1 in L. Meyer's classification. The diagnosis is based on the characteristic foci of epithelial clefts with or without central clefts and on the surrounding fibrous tissue.

These tumors have neither biologic nor clinical significance because they are usually very small in size, are benign and produce no hormonal action. Meyer believes that they arise from celom epithelium. They may develop as solid tumors in which nests of epithelial cells are embedded in the fibrous connective tissue or the cell differentiation may lead to cyst formation. In the latter type this cyst formation may go on to the formation of a large cystoma with an intramural solid Brenner tumor or nodule, with or without cyst formation. Orthmann was the first to describe this type of tumor and the author agree with Plaut who uses the anatomic term of "benign mucinous fibro-epithelioma."

RALPH A. REIS.

Erratum

In the Item for the Committee for the Study of Sex Variants, page 759, November, 1935 issue, paragraph 6, line 3, should read: "Plans are far advanced for (1) a study of homosexuality as it exists among the members of the U. S. Merchant Marine."

Correspondence

To the Editor:

The comprehensive presentation, by J. Mason Hundley and associates in a paper entitled *Physiologic Changes Occurring in the Urinary Tract During Pregnancy,* in the November issue (1935) of the JOURNAL, supplies a vast amount of exceedingly useful and practical data, not entirely new. It serves to crystallize our knowledge of the subject under consideration. But I cannot desist from remarking that several of his statements require correction and certain focal points about which the problem revolves have been omitted in this treatise. Science is regarded as the single-minded pursuit of truth. Toward this accomplishment the following discussion is offered.

Until 1928, biologic or anatomic research on the etiology of ureteral dilatation during pregnancy and its bearing on several aspects of pyelitis has been conspicuously lacking. It is with a certain sense of pardonable pride at the achievement that, as the universal acclaim accorded my addresses tends to indicate, the appearance of these contributions apparently turned the tide.*

Because of the frequency of pyelitis complicating pregnancy, the incidence being 5 per cent of all pregnant women not including the mild cases which do not require admission to the hospital, our studies attempted to determine and reveal unrecognized but actual predisposing etiologic factors and their correction whenever found feasible. It was realized at the outset that the problem is one of considerable complexity and should be attacked from a combined point of view. In our study, a clear understanding of the finer anatomy of the ureter during gestation appeared to be the first consideration; the integration of this and additional information being looked for in the successful delineation of the entire ureter and renal pelvis in pyelograms taken during the various months of pregnancy. On painstaking examination, very remarkable phenomena were found to occur as invariable features of the histology of the juxtavesical portion of the ureter during pregnancy—the interlacing of hypertrophied muscle bundles and hyperplastic, newly formed, dense connective tissue strands. It was emphasized that this part of the ureter has, thus, become converted from a collapsible organ into a more or less unyielding tube, and, making its way as it does through the narrow space between the bladder wall and the anterior vaginal vault, readily assumes the features of a stricture. Furthermore, this new formation of fibroblasts in the ureteral wall represented the counterpart of analogous phenomena in the uterine wall during gestation. Moreover, ureteral rigidity due to the basic structural alteration of its wall, was found to be still further accentuated by an encircling ring resulting from an excessive hypertrophy of the ureteral sheath, most noticeable at the junction of the ureter with the bladder. A number of photomicrograms served to give an idea of the wide range of variation in the hypertrophic changes of the ureteral sheath noted in our specimens. Particular stress was placed upon the hypertrophic changes, observed by us likewise for the first time, in the bladder trigone and the plica ureterica, the neck of the bladder and upper third of the urethra, notably the sphincter of the urethra; they lent themselves to the consideration of the multiplicity of obstructive lesions in the lower urinary tract.

The importance of ureteral obstruction as an etiologic factor in pyelitis has since been receiving an increasingly greater amount of attention. Color is lent to this

*Bull. Johns Hopkins Hosp. **16**: 1928; J. Urology **20**: 1928; Chapter XIX, in Curtis *Obstetrics and Gynecology.*

conception by Hundley's observation of definite hypertrophy of the ureteral sheath in a pregnancy of seven weeks' duration. Not in accord with my views, however, is Hundley's statement (page 647), "Hofbauer is of the opinion that hypertrophy of the ureteral sheath is the important factor in the production of dilatation of the ureter." The inconsiderable amount of hypertrophy of the muscular and connective tissue elements in the upper urinary tract, in contradistinction to the density of structure seen in the lower urinary tract, has been duly stressed in my first publication. And the point was made that the variable capacity for distention of the ureter consequent upon an obstructive ureteral lesion, may depend in great measure upon the intrinsic conditions of its individual parts. Hence, no appreciable dilatation should be expected to occur in the lower portion of the ureter during gestation while the condition of its abdominal part conduces to dilatation. Considered from this angle, Hundley's arguments against the mechanical point of view lose much of their validity.

A detailed analysis, in my second contribution to the problem, of factors which may be responsible for the dilatation and atony of the ureter during gestation, adduced experimental evidence tending to show that the depressing effect of bile-salts, and consequent upon it, the lowering of surface tension of the serum may account for the loss of tone, in the pregnant state, of the uterine and ureteric muscle and for the sluggishness of the gallbladder and small intestine. Recent experimental work serves to incriminate the anterior pituitary gland, also. Ureteric atony was considered, in this address, a factor of primary significance in the etiology of the condition incident to pregnancy. At the occasion of a symposium on pyelitis of pregnancy, held (in 1933) at the meeting of the Urologic branch of the American Medical Association, I remarked: "More emphasis should be placed on atony of the ureter during pregnancy, rather than on dilatation." (J. A. M. A. **101**: 1932.) With a view to counteract, if possible, the ureteric atony and its potential dangers, certain drugs, particularly pituitary extract, were suggested in my papers. That these have not been merely hopeful fantasies, is attested by the favorable results obtained with this treatment of certain cases of pyelitis of pregnancy by DeLee, Lower, myself, and others.

That the fetal position has no bearing upon the dilatation changes observed in the urinary tract, is being stressed in my summary in Curtis' *Obstetrics and Gynecology* (Chapter XIX).

Having failed to produce experimentally the hypertrophic changes characteristic of the ureteral structure during gestation, Hundley finally quotes his interesting observation of muscular hypertrophy of the pelvic ureter in a case of chorion-epithelioma. He considers "the prolan elaborated by the trophoblastic tissue of the chorionepithelioma stimulated the testicle with a subsequent outpouring of growth hormone." Without detracting from the brilliance of this conception, I am rather inclined to think in terms of augmented anterior pituitary growth hormone production, basing my arguments both on the changes known to occur in the anterior lobe of the pituitary gland in cases of chorionepithelioma and on the experimental findings in the uterus following the parenteral administration of anterior pituitary substance (Hofbauer, Gander: Ztschr. f. Exper. Med. **72**: 1930). Since the ureteral changes observable under such conditions are to be described in a forthcoming paper, for present purposes this need not be pursued here any further.

J. HOFBAUER.

Cincinnati, Ohio
Jan. 4, 1936